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# Aspen Community Types of the Intermountain Region

**Walter F. Mueggler**



## RESEARCH SUMMARY

This vegetation classification for the aspen-dominated forests of the Forest Service's Intermountain Region is based on existing community structure and plant species composition. Included are 56 community types that occur within eight tree-cover types. The types are grouped into three abundance categories (major, minor, incidental). Only 14 of the types are required to describe approximately two-thirds of the aspen stands within the Region. A diagnostic key using indicator species facilitates field identification of the community types. The key is followed by narrative descriptions of the distribution, vegetal composition, successional status, and the forage and wood fiber productivity of each type. Appendix tables provide detailed comparisons of the types. The classification and descriptions are based upon field data from over 2,100 aspen stands scattered over southeastern Idaho, western Wyoming, Utah, and Nevada.


## THE AUTHOR


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Special recognition is given for the able assistance of Robert R. Campbell, Jr., formerly a botanist with the Intermountain Station's Aspen Ecology research work unit, who not only participated fully in field phases of work in Idaho, Utah, and Nevada, but was indispensable in preparing data for analysis and resolving computer processing problems. He coauthored two of the preliminary publications related to this work. The current analysis and interpretations are the sole responsibility of the author.



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## INTRODUCTION

Western wildlands are covered by a broad spectrum of vegetation zones, from dense forests to barren deserts. Each of these major zones consists of a melange of plant communities, differing in species composition and potential productivity, which are dependent upon sometimes rather subtle environmental influences as well as upon direct and indirect human impacts. Indeed, wildland managers must contend with what often appears to be a chaotic assemblage of overlapping land and vegetation units, each with its own combination of resource values and management sensitivities. Intensive management of these wildlands requires an ability to recognize the units of land and vegetation with similar production capabilities and similar response to management activities. Classification serves to create order out of this chaos. Increasing emphasis on intensive management of our wildlands has thus stimulated efforts in recent years to develop detailed classification systems for these wildlands.

Within the Intermountain Region of the Forest Service, U.S. Department of Agriculture, wildland classifications have been developed for the sagebrush-grass communities of southern Idaho (Hironaka and others 1983), the subalpine forb communities in western Wyoming (Gregory 1983), riparian communities of eastern Idaho, western Wyoming, and northern Utah (Youngblood and others 1985a, 1985b), the coniferous forests of southern Idaho and western Wyoming (Steele and others 1981, 1983), and the coniferous forests of Utah (Mauk and Henderson 1984; Youngblood and Mauk 1985). My own efforts have centered on the development of a classification for the extensive and important aspen woodlands of the Intermountain Region (Mueggler and Campbell 1982, 1986; Youngblood and Mueggler 1981).

Western forests dominated by aspen (*Populus tremuloides* Michx.) are highly regarded by most resource managers for their ability to provide a wide variety of benefits. They are a classic example of multiple-use wildlands. Traditionally valued in the interior West as luxuriant summer range for livestock, they are also considered prime habitat for many species of wildlife, productive watersheds, and significant contributors to western scenery (DeByle and Winokur 1985). Although these lands historically have been an important local source of fuel and wood products where other trees are scarce, such as in portions of Nevada, their production of wood fiber has not been used appreciably where coniferous forests are common. Aspenlands continue to provide a valuable summer grazing resource for cattle and sheep (Mueggler 1985b), although the number of livestock on these lands has been reduced from the excessive levels present at the turn of the century. Reduced livestock use has been offset by increased recognition of the importance of these lands as habitat for many wildlife species (DeByle 1985). Perhaps the most influential change in use of resources produced by these lands relates to wood fiber. Demand for aspen as a fuelwood has increased markedly (Pierson 1981), as has interest in aspen in the production of waferboard and other such fiber products (Wengert and others 1985). Increased use of wood from these lands greatly increases the options and feasibility of management to improve all resource values.

### Distribution

Aspen-dominated woodlands are a major forest type in many portions of the interior West. The Intermountain Region alone contains over 2.5 million acres (1 million ha) of aspen forests (Green and Van Hooser 1983), or almost 10 percent of the total forested area (if pinyon-juniper woodlands are excluded). These aspen forests range in size from small, isolated groves to broad expanses of pure and mixed stands. Utah has approximately 1.6 million acres (650,000 ha) of aspen, much of which occurs in extensive stands (fig. 1). This amounts to almost a fourth of Utah's forests. Considerably less aspen is found in southern Idaho and western Wyoming, approximately 800,000 acres (324,000 ha), but it usually occurs as conspicuous small, scattered groves that are a highly valued part of the landscape.

Nevada, the driest State in the Union, has almost 250,000 acres (100,000 ha) of aspen-dominated woodlands. These are widely distributed throughout many of the higher mountain ranges of the State where moisture and temperature relationships are suitable for the growth of this relatively mesic species. But compared to the extensive and well-formed stands of Utah, aspen growth in Nevada is marginal. It tends to occur there as small to medium-size groves in the specialized environments of high-elevation basins, swales, draws, and on the lee side of ridges where snow frequently accumulates (fig. 2).

### Environment

Aspen grows on a wide variety of upland sites in the Intermountain Region. This broad environmental amplitude is reflected in its being the most widely distributed tree species in all of North America (Little 1971). It is found on soils derived from various igneous, sedimentary, and metamorphosed parent rock, but it appears to grow best on limestones, basalts, and neutral or calcareous

Figure 1—Aspen-dominated woodlands, such as these extensive stands in central Utah, make up approximately 10 percent of the Intermountain Region's forests.

Figure 2—In the drier parts of the Intermountain Region, such as here on the Humboldt National Forest in northeastern Nevada, aspen commonly occurs as scattered groves in relatively moist swales and basins where its importance to wildlife is especially great.

shales (Jones and DeByle 1985a). Aspen's growth appears to be limited primarily by adequacy of the soil moisture required to meet its heavy evapotranspirational demands. Therefore, in the Intermountain Region the species is usually confined to relatively moist sites with at least 15 inches (38 cm), but more commonly over 20 inches (51 cm), annual precipitation, cold winters, deep snows, and reasonably long growing seasons (Jones and DeByle 1985b). Accumulation zones of subsurface moisture and the ameliorating effects of topography on evapotranspiration are usually critical in permitting aspen to occupy sites at its lowest limits of precipitation.

Elevational limits of aspen within the Region range from approximately 5,200 to 10,500 ft (1,580 to 3,200 m). The elevations of most common occurrence, as well as elevational limits, generally increase with decreasing latitude (table 1). For example, the modal elevation for aspen stands in the northern part of the Region in southeastern Idaho and western Wyoming, between 42° and 44° latitude, is 6,600 ft (2,000 m). In the southern part of the Region between approximately 37.5° and 39° latitude the modal elevation is 8,800 ft (2,680 m). Aspen in northern Nevada, between 41° and 42° latitude, has a modal elevation of 6,800 ft (2,070 m). Its modal elevation farther south, between 38.5° and 39.5° latitude, is 9,500 ft (2,900 m). At its lowest elevations, especially in Nevada and southern Utah, aspen occurs frequently as stringers confined to riparian environments that may extend downward to elevations 500 to 1,000 ft (150 to 300 m) below the zone of usual occurrence. Upper elevational limits appear to be determined primarily by length of growing season, and lower elevational limits by evapotranspiration. Aspen at the upper elevations is commonly restricted to southerly exposures, whereas that at the lower elevations tends to occur on northerly and easterly exposures or in swales and draws that are collectors of precipitation runoff.

As a species, aspen is adapted to a much broader range of environments than most plants found associated with it. Aspen is one of the few plants able to grow in all mountain vegetational zones, from the alpine tundra to the basal plains (Daubenmire 1943). As a consequence, it can be found as part of the vegetation mosaic of a broad range of zones. Aspen frequently occurs at its lowest elevations as stringers or small islands on the fringe of the semiarid sagebrush-grass steppes. At intermediate elevations it usually is found as pure or mixed stands interspersed among a variety of coniferous forest types or as groves among forest-herbland ecotones. At the higher elevations within the Intermountain Region, it functions primarily as a seral dominant tree within the cool, moist, spruce-fir forest habitat types. The overstory and undergrowth species within the aspen-dominated forests at these various elevations in part reflect species composition of these adjacent vegetation types.

## Succession

Successionally, aspen functions both as a seral species in habitat types where conifer trees are climax, and as a climax dominant in aspen forest habitat types. The abundance of aspen throughout much of the interior West is believed to result from the historic prevalence of wildfires in the coniferous forest zones. Aspen reproduces vigor-

**Table 1**—Relation between latitude and the elevation where aspen forests occur in the Intermountain Region

| Area | Latitude range | 80 percent elevational range[1] | |
|---|---|---|---|
| | | *Feet* | *Meters* |
| Western Wyoming SE Idaho (N=511)[2] | 42°-44° | 6,000-8,200 | 1,828-2,500 |
| Northern Utah (N=484) | 40½°-42° | 6,500-8,900 | 1,981-2,713 |
| Southern Utah (N=295) | 37½°-39° | 8,100-9,700 | 2,469-2,957 |
| Northern Nevada (N=190) | 41°-42° | 6,500-7,700 | 1,981-2,347 |
| Southern Nevada (N=151) | 38½°-39½° | 8,000-9,700 | 2,438-2,957 |

[1]Excluding the lower 10 percent and upper 10 percent of aspen stands examined.
[2]Number of aspen stands.

ously by root suckers following fire. It is thus able to dominate a site more rapidly than conifers, which depend upon seed for regeneration. Aspen may dominate the forest community on conifer-climax sites for many decades, even centuries, but will gradually decline as the more shade-tolerant conifers become reestablished. However, the role of wildfires in maintaining aspen communities in the West has changed. DeByle and others (1987) have determined that it would take approximately 12,000 years to complete a fire cycle under the present regimen of wildfires. Thus, many stands once dominated by aspen are well along in the process of replacement by conifers.

Aspen occurs as a major seral species in the following coniferous forest series within the Intermountain Region: *Picea engelmannii, Abies lasiocarpa, Pseudotsuga menziesii, Abies concolor, Picea pungens,* and *Pinus ponderosa* (Mauk and Henderson 1984; Steele and others 1981, 1983; Youngblood and Mauk 1985). In addition, aspen is a minor seral tree in the *Pinus albicaulis* series (Steele and others 1983) and *Pinus flexilis* series (Youngblood and Mauk 1985). As a seral species, it may dominate the forest community for many decades following severe disturbance, such as fire or clearcutting, but will gradually decline as the conifers become reestablished. In relatively rare cases, aspen may persist as a self-perpetuating minor component of the climax conifer overstory.

Aspen forests are stable or climax communities not only in the Intermountain Region (Mueggler and Campbell 1982, 1986; Youngblood and Mueggler 1981) but also in Montana (Lynch 1955), southeastern Wyoming (Alexander and others 1986; Wirsing and Alexander 1975), North Dakota (Hansen and others 1984), South Dakota (Hoffman and Alexander 1987; Severson and Thilenius 1976), and Colorado (Hess and Alexander 1986; Hoffman and Alexander 1980; Johnston and Hendzel 1985; Langenheim 1962). The environmental conditions determining aspen's role as a seral or as a climax tree species remain ill-defined. This flexibility in successional status, especially the ability to function as a major seral tree in a wide variety of coniferous forest series, contributes greatly to the diversity of overstory and undergrowth composition that exists in aspen forests in the Intermountain Region. Composition of these seral aspen communities changes over time as the community progresses in the course of normal succession toward dominance by conifers. As conifers gain dominance less light penetrates to the forest floor, and undergrowth shrubs and herbs decrease in both variety and abundance.

## Grazing

Grazing has also contributed to the variability of the Region's aspen forests. Settlement during the middle and latter part of the 19th century depended heavily upon the livestock industry. The lush undergrowth of aspen forests was considered excellent summer range. Over a century of grazing—frequently intense in the late 1800's and early 1900's, and by different classes of livestock as well as occasionally by wild ungulates—left its mark in both pronounced and ill-defined alterations in species composition and production.

## Aspen Genotypes

Aspen's usual vegetative mode of reproduction results in clones within which the individual trees are genetically identical. However, there exist striking, genetically caused differences between clones in physical appearance, resistance to disease, and, in all probability, response to human perturbations (Barnes 1975; Jones and DeByle 1985c). Differences probably exist in the adaptability of different genotypes to particular environmental situations, but this has yet to be demonstrated quantitatively. Although the genotype of a specific aspen clone is unlikely to directly affect the undergrowth vegetation within the clone, it likely will have an effect on the potential of the clone to produce wood fiber.

## Community Variability

Thus, environment, succession, grazing, and genetics have all contributed to the variability encountered today in the aspen forests of the Region. This variability is expressed by differences in the structure of plant communities as well as by differences in their species composition. Most aspen stands have an even-aged canopy because of rapid regeneration by suckering following a major disturbance such as fire. However, uneven-aged stands form when an aspen overstory slowly disintegrates because of disease or age and is gradually replaced by growth of released suckers. Most aspen communities are multilayered. Sufficient light is able to penetrate the aspen-dominated overstory to support an abundance of undergrowth, especially in comparison to the usual paucity of herbs and shrubs in adjacent coniferous forests. Community structure can be simple or complex. For example, the tree layer may consist of either pure aspen (a deciduous, broad-leaved tree) or a mixture of aspen with evergreen conifers ascending into the canopy. The undergrowth is frequently a multilayered assemblage of shrubs, perennial herbs, and annuals. The shrub stratum itself may consist of an intermittent tall shrub layer 6 to 12 ft (1.8 to 3.7 m) high and a low shrub layer 3 to 4 ft (0.9 to 1.2 m) high, whereas the herb layer may consist of a mixture of life forms—tall forbs, low forbs, grasses, and sedges. The most complex structure contains all of these layers. The simplest consists of a pure, even-aged aspen canopy underlain by a simple assemblage of graminoids.

Among the hundreds of plant species present in the aspen forests of the Intermountain Region (over 550 encountered in this study alone), surprisingly few can be considered characteristic of the aspen type. The assemblage of species in the undergrowth varies greatly from place to place. Only four species (*Symphoricarpos oreophilus, Agropyron trachycaulum, Achillea millefolium,* and *Thalictrum fendleri*) occurred in more than half of the over 2,100 aspen stands sampled in the Region (see section, "Aspen Community Characteristics"). Using the criteria of at least 25 percent constancy (that is, occurring in a fourth of all stands) and at least 5 percent average canopy cover in stands where the species occurs to indicate a "characterizing" species, only 12 met these conditions. Three were shrubs (*S. oreophilus, Amelanchier* *alnifolia, Berberis repens*), four were grasses (*Bromus carinatus, Elymus glaucus, Stipa occidentalis, Poa pratensis*), and five were forbs (*Thalictrum fendleri, Osmorhiza chilensis, Geranium viscosissimum, Valeriana occidentalis,* and *Lupinus argenteus*). In a separate analysis (Mueggler 1985a), I determined that *S. oreophilus* and *T. fendleri* are the only characterizing species common to the Central and Southern Rocky Mountain, Colorado Plateau, and Basin and Range Provinces of the interior West. Obviously then, the broad environmental amplitude of aspen accommodates many undergrowth combinations consisting of assemblages of species with relatively restrictive environmental requirements.

## APPROACH

The primary purpose of this effort was to develop a framework that would sensibly partition the extant variability of the aspen communities in the Intermountain Region. The goal was a classification system to facilitate resource management. The effort was based upon two assumptions. The first is that major differences in vegetation composition reflect meaningful differences in environment, successional stage, grazing history, or combinations of these influences. The second assumption is that these differences in community composition are indicative of probable differences in resource values and responses to manipulatory management.

In addition to the development of a classification, an attempt was made to obtain as much information as time allowed on resource productivity levels of the various communities. The study was not designed to develop recommendations for the management of the different communities. Instead, the classification should serve as a mapping tool and provide the organizational framework to which management experience and the results of management studies can be attached. (Appendixes A through M give readers further details on the study.)

A community type approach to classification development was chosen in preference to a habitat type approach because of the ill-defined successional status of communities within the overall aspen ecosystem. The habitat type approach relies upon the ability to recognize the potential or climax vegetation of a given environmental situation—an approach that is fraught with uncertainty in aspen communities. Community types, however, are aggregations of similar plant communities based upon existing floristics regardless of successional status. As with habitat types, community types are based upon the premise that the vegetation is an environmental integrator and thus reflects major environmental differences. In contrast to habitat types, however, the existing vegetation also reflects the effects of past disturbances. Therefore, community types may represent either climax plant associations or successional communities within a sere. Community types are what the manager actually sees in the field. Once community types are defined, effort can be directed toward establishing successional relationships and linking the community types to known or expected climax plant associations (placing them within habitat types). Meanwhile, the community types can be used as a basis for mapping, structuring information, and resource management planning.

The need to incorporate successional status in the classification breakdown was recognized from the outset. Aspen's dominant seral role in a variety of coniferous forest habitat types was of immediate concern. Separation criteria for recognizing these naturally seral situations were required. These communities were subsequently placed in separate aspen-conifer overstory cover types. Impacts of intense past grazing on community composition became apparent as field study progressed and suggested the probable existence of long-term grazing disclimax situations. In most cases, however, grazing-induced changes in composition were more subtle and, though highly probable, were difficult to evaluate. Existence of communities that represented climax or near-climax composition could only be inferred from previous knowledge of species grazing preference and probable response to use. The extreme stocking at the turn of the century virtually assured grazing on all accessible sites, and few aspen forests in the Region exist on areas protected by physiographic barriers. Consequently, "benchmark" areas of known climax composition were not available to establish reliable indicators for climax or near-climax aspen communities.

During the study it became apparent that recognition of differences in vegetation structure would enhance the usefulness of the classification. The presence or absence of conifers in the overstory, and the presence or absence of tall and low shrubs in the undergrowth, are particularly relevant to the value of aspen communities as wildlife habitat. Such structural differences also tend to reflect environmental differences and can have a pronounced influence on the herbaceous undergrowth. Therefore, vegetation structure was incorporated early into the classification breakdown.

Indicator species for the various structural layers were selected on the basis of constancy and cover within a layer and on perceived sensitivity to major differences in abiotic environment. Guilds of species such as tall forbs were used when necessary to avoid what appeared to be unwarranted splitting of types based solely upon differential abundance of individual species with similar ecological requirements. Separation of obvious grazing disclimax situations was a final consideration in forming the classification. Figure 3 illustrates the flow of considerations in development of the classification.

Work on this study progressed in phases over 8 years. Formal work began with data collection, analyses, and a preliminary classification developed for western Wyoming (Youngblood and Mueggler 1981). This was followed by a description of aspen community types in southeastern Idaho (Mueggler and Campbell 1982) and in Utah (Mueggler and Campbell 1986). Data were then gathered for the aspen communities on the Humboldt and Toiyabe National Forests in Nevada during the summer of 1984 and subsequently analyzed but not published. Stand

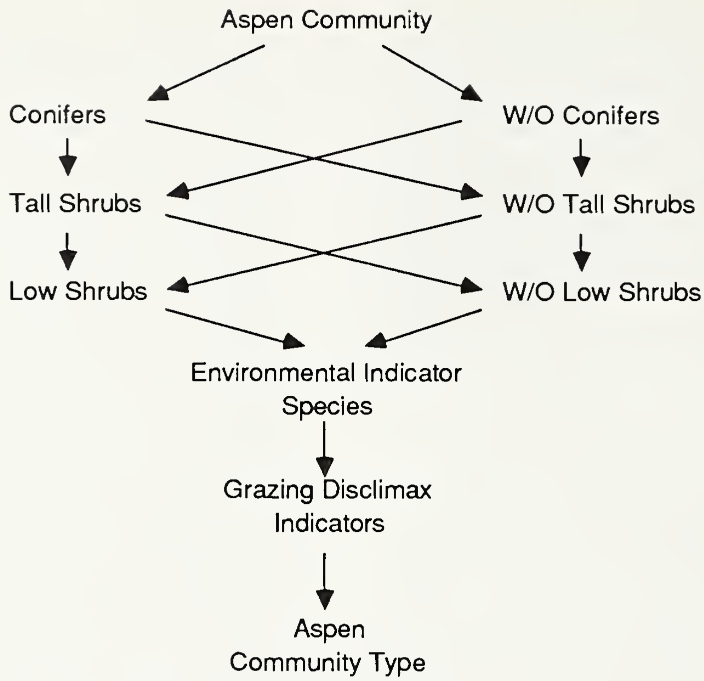


Figure 3—Flow of considerations in development of the classification.

composition data furnished by cooperators studying aspen-to-conifer succession were incorporated in the overall data set when these data were considered reliable and in suitable form. Less than 10 percent of the data base was obtained from these cooperators.

The reports on portions of the Region were developed independently rather than by progressive extension of the classification from one area into the next. This procedure profoundly affected subsequent changes in type names as well as differences in the formation of community types. Concepts of the importance of vegetation structure and the indicator value of certain plant species to the development of the classification evolved as understanding of community variability and succession improved with experience. Analysis of the composite data-set for the entire Region, incorporating this improved understanding, was therefore desirable to enable the development of a unified classification of aspen community types for the whole Intermountain Region. This publication, therefore, supersedes the independent classifications. The linkage between type names assigned in those preliminary, partial classifications and this comprehensive Regional classification is shown in appendix D. Aspen communities in the western and central Idaho portions of the Region, as well as those in extreme western Nevada, were not sampled. This document is, however, based on data from the remainder of the Intermountain Region (fig. 4) where the bulk of the aspen woodlands occurs.

Details of field sampling procedures are described in appendix A. Briefly, the need for a large number of sampled stands to evaluate type variability and upon which to base the classification, plus the desire to obtain the quantitative data needed to describe productivity factors, dictated the use of two types of sample plots. Reconnaissance plots helped in obtaining the large volumes of species composition data based upon canopy cover estimates. Intensive plots were designed to yield data on stand structure, age, productivity, and environment, as well as upon species composition. Only two criteria were used in selecting a stand for sampling: at least 50 percent of the tree canopy had to be aspen, and the stand needed to be large enough to accommodate a single $^{1}/_{13}$-acre ($^{1}/_{32}$-ha) macroplot within an approximately uniform environment. Although stand selection was subjective, preconceived biases that could affect the resulting classification were avoided. Data were acquired for 2,137 aspen stands in the Intermountain Region area. Approximately a fourth of these were intensively sampled.

Taxonomic uncertainties, species similarities, and certain nomenclature ambiguities necessitated combinations of some species under a single name; the details of these combinations are discussed in appendix A. Species listed in the community type composition tables (table 2; appendix F) that are followed by a "+" are those names representing more than a single taxon. The following species combinations were used in the determination of community types, in the text, and in all tabular summaries:

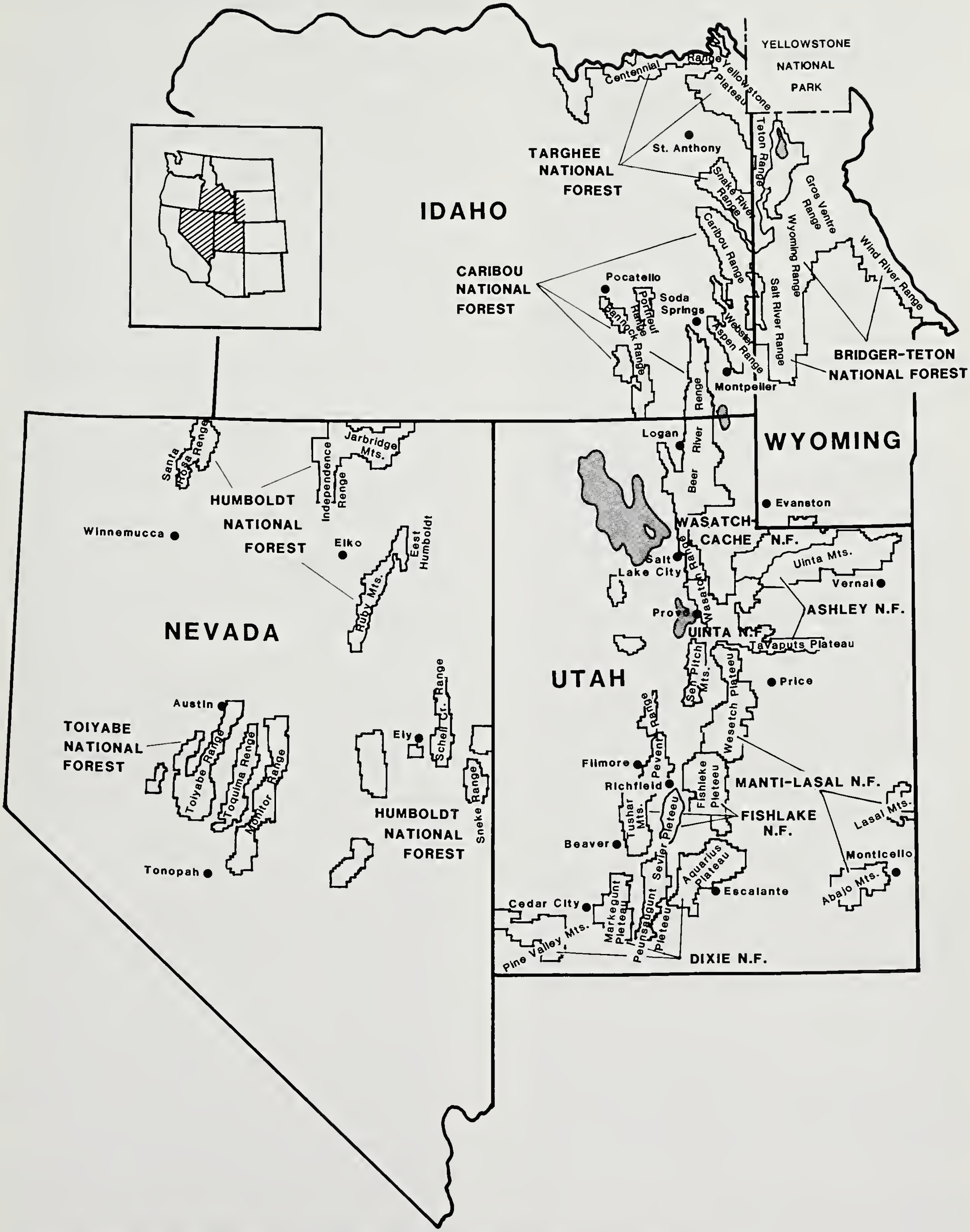


Figure 4—Area of the Intermountain Region covered by this classification of aspen community types.

| Name used: | Includes: |
|---|---|
| *Rosa woodsii* | *Rosa nutkana* |
| *Sambucus racemosa* | *Sambucus cerulea* |
| *Agropyron trachycaulum* | *Agropyron subsecundum, Agropyron caninum* |
| *Bromus carinatus* | *Bromus marginatus, Bromus polyanthus* |
| *Festuca idahoensis* | *Festuca ovina* |
| *Koeleria cristata* | *Koeleria nitida* |
| *Stipa occidentalis* | *Stipa columbiana, Stipa nelsonii* |
| *Delphinium occidentale* | *Delphinium barbeyi* |
| *Fragaria vesca* | *Fragaria virginiana* |
| *Geranium viscosissimum* | *Geranium fremontii* |
| *Mertensia arizonica* | *Mertensia ciliata, Mertensia franciscana* |
| *Osmorhiza chilensis* | *Osmorhiza depauperata* |
| *Polemonium foliosissimum* | *Polemonium occidentale* |
| *Senecio serra* | *Senecio triangularis* |
| *Thalictrum fendleri* | *Thalictrum occidentale* |

Analytical procedures used to form relatively homogeneous groups of stands representing community types consisted primarily of comparisons of species composition by the use of synthesis or association tables (Mueller-Dombois and Ellenberg 1974). The canopy cover estimates of individual species in each stand formed the basic data for these comparisons. In addition to species composition, emphasis was placed on similarities in vegetation structure and on the constancy and fidelity (restriction to the group) of species within possible groups. Numerous reiterations of computer-formed stand alignments permitted the sequencing of stands according to similarities of what were considered to be important vegetation characteristics. Following determination of what appeared to be sensible groups (community types), a dichotomous key was prepared to facilitate field use of the classification. The key was checked against all stands used to form the groups and then was validated by use on an additional set of stands initially withheld from the data base used to form the classification. Of all stands, 6 percent could not be accommodated by the key or classification. These stands are believed to represent either unusual isolated communities or ill-defined types representing unusual environmental or disturbance situations.

Summary data were then prepared showing by aspen community type the following factors: species constancy and average cover (appendix F); production and growth estimates for aspen (appendixes I and J); undergrowth production (appendix L) and forage suitability (appendix K); and the distribution of community types by the National Forests within the Intermountain Region (appendix C). Appendix A discusses the analytical procedures followed in developing the classification and productivity information.

## ASPEN COMMUNITY CHARACTERISTICS

The general characteristics of aspen-dominated forests within the Intermountain Region were examined in terms of community composition, community structure, and productivity of both the overstory and the undergrowth.

### Variability in Community Composition

These forests perhaps are best characterized by variability in both species composition and vegetation structure. Over 550 plant species were found associated with aspen in this study. Few of these occurred in a substantial proportion of the stands (that is, had high constancy). For example, only four occurred in at least half of the 2,137 stands evaluated, 21 in at least a quarter, and 65 in at least 10 percent of the stands (table 2). This generally low overall constancy is attributable to the broad environmental adaptability of aspen compared to its associates. These most common associated species include representation from all of the major vegetation classes. However, a greater variety of forbs are usually present than graminoid, shrub, or tree life forms. They also include species associated with obviously different environments. For example, *Artemisia tridentata, Carex rossii, Bromus anomalus,* and *Lupinus argenteus* often occur in relatively dry situations compared to *Abies lasiocarpa, Aquilegia coerulea, Delphinium occidentale,* and *Senecio serra.* And some species are generally susceptible to excessive grazing and browsing (such as *Amelanchier alnifolia, Prunus virginiana, Sambucus* spp., *Heracleum lanatum, Osmorhiza occidentalis, Castilleja miniata),* whereas others usually increase under heavy grazing (such as *Juniperus communis, Poa pratensis, Taraxacum officinale, Rudbeckia occidentalis, Astragalus miser,* and *Nemophila breviflora*).

The challenge of developing a useful classification for these highly variable aspen forests lies in recognition of common patterns in what appears to be an unlimited number of possible species combinations. The number of combinations are virtually limitless because no two naturally occurring plant communities are identical. These combinations of species not only reflect environmental and successional gradients but are also frequently influenced by the chance proximity of propagules. Thus, a classification unit must be defined from a perceived level of commonality within a group of individual stands that differ from one another. Seldom if ever can these communities be readily sorted into neat, clearcut taxonomic units. Developing a classification becomes a matter of judging the amount of structural and compositional variability tolerable in defining the taxonomic units. The amount of variability acceptable should be determined by the need for, and the projected use of, the classification.

Similarity of life form and perceived similarities in environmental adaptability of some species enabled recognition of certain species groups or guilds. This was useful for structuring the classification system, for then the presence of one or more guild members could serve equally as a community type indicator. Foremost among the recognizable guilds are the tall forbs. This group of species is an indicator of a major undergrowth type that occurs under various combinations of shrub and tree strata. Nine forb species are included in the tall forb guild: *Agastache urticifolia, Aster engelmannii, Delphinium occidentale, Hackelia floribunda, Heracleum*

Table 2—Most commonly encountered species (10 percent or greater constancy) in the aspen types of the Intermountain Region. Species are arranged by synusia and by constancy of occurrence

| Species | Constancy | (cover)[1] |
|---|---|---|
| **Trees** | | |
| *Populus tremuloides* | 100 | (69) |
| *Abies lasiocarpa* | 29 | (10) |
| *Pseudotsuga menziesii* | 19 | ( 5) |
| *Pinus contorta* | 12 | ( 9) |
| *Picea engelmannii* | 10 | ( 6) |
| *Pinus flexilis* | 10 | ( 2) |
| **Shrubs** | | |
| *Symphoricarpos oreophilus* | 73 | (15) |
| *Rosa woodsii* + | 40 | ( 3) |
| *Berberis repens* | 37 | ( 6) |
| *Amelanchier alnifolia* | 34 | ( 7) |
| *Prunus virginiana* | 22 | (13) |
| *Juniperus communis* | 16 | (19) |
| *Pachystima myrsinites* | 14 | (10) |
| *Artemisia tridentata* | 10 | ( 4) |
| **Graminoids** | | |
| *Agropyron trachycaulum* + | 51 | ( 4) |
| *Bromus carinatus* + | 46 | ( 8) |
| *Elymus glaucus* | 37 | (10) |
| *Poa pratensis* | 34 | (15) |
| *Stipa occidentalis* + | 25 | ( 6) |
| *Melica spectabilis* | 17 | ( 2) |
| *Poa nervosa* | 17 | ( 4) |
| *Carex hoodii* | 16 | ( 3) |
| *Calamagrostis rubescens* | 15 | (33) |
| *Carex geyeri* | 15 | (16) |
| *Carex rossii* | 15 | ( 4) |
| *Bromus ciliatus* | 11 | ( 3) |
| **Forbs** | | |
| *Achillea millefolium* | 56 | ( 2) |
| *Thalictrum fendleri* + | 54 | (10) |
| *Taraxacum officinale* | 49 | ( 3) |
| *Geranium viscosissimum* + | 45 | ( 7) |
| *Osmorhiza chilensis* + | 44 | ( 5) |
| **Forbs (Con.)** | | |
| *Stellaria jamesiana* | 35 | ( 2) |
| *Lupinus argenteus* | 30 | ( 7) |
| *Agastache urticifolia* | 27 | ( 4) |
| *Valeriana occidentalis* | 25 | ( 5) |
| *Hackelia floribunda* | 25 | ( 3) |
| *Senecio serra* + | 24 | ( 4) |
| *Fragaria vesca* + | 24 | ( 3) |
| *Rudbeckia occidentalis* | 23 | (10) |
| *Osmorhiza occidentalis* | 19 | ( 7) |
| *Aster engelmannii* | 18 | ( 3) |
| *Smilacina stellata* | 18 | ( 3) |
| *Galium boreale* | 17 | ( 2) |
| *Potentilla glandulosa* | 17 | ( 1) |
| *Lathyrus lanszwertii* | 16 | (16) |
| *Vicia americana* | 16 | ( 6) |
| *Frasera speciosa* | 14 | ( 1) |
| *Potentilla gracilis* | 14 | ( 1) |
| *Astragalus miser* | 13 | (10) |
| *Mertensia arizonica* + | 13 | ( 8) |
| *Erigeron speciosus* | 13 | ( 2) |
| *Viola nuttallii* | 13 | ( 2) |
| *Arnica cordifolia* | 12 | ( 8) |
| *Delphinium occidentale* + | 12 | ( 3) |
| *Epilobium angustifolium* | 12 | ( 3) |
| *Hydrophyllum capitatum* | 12 | ( 1) |
| *Castilleja miniata* | 11 | ( 1) |
| *Aquilegia coerulea* | 10 | ( 1) |
| *Perideridia gardneri* | 10 | ( 1) |
| *Viola adunca* | 10 | ( 1) |
| **Annuals** | | |
| *Descurainia richardsonii* | 20 | ( 1) |
| *Nemophila breviflora* | 18 | (17) |
| *Galium bifolium* | 15 | ( 5) |
| *Polygonum douglasii* | 13 | ( 4) |
| *Collomia linearis* | 11 | ( 2) |

[1]Average canopy cover for those stands in which the species occurs.

*lanatum, Mertensia arizonica, Osmorhiza occidentalis, Senecio serra,* and *Valeriana occidentalis*. Various combinations of these species frequently occur together. Seldom does one member alone dominate the undergrowth. Although the environmental amplitude of each undoubtedly differs, enough similarity exists to warrant grouping for purposes of this classification.

Other guilds recognized and used in the development of the classification include combinations of shrubs and combinations of graminoids, as well as combinations of other forbs. *Amelanchier alnifolia* and *Prunus virginiana* constitute a tall shrub guild; these species frequently occur together, and no discernible difference could be detected in their environmental requirements. In contrast, the graminoids *Calamagrostis rubescens* and *Carex geyeri* are treated as a guild even though they do not often occur together because of geographical separation; they do, however, appear to occupy similar environmental niches and have somewhat similar growth forms. The comparatively common low forb species *Thalictrum fendleri, Osmorhiza chilensis,* and *Geranium viscosissimum* are viewed as a guild because of lack of apparent environmental separation. Finally, the upright grasses *Bromus carinatus, Elymus glaucus,* and *Agropyron trachycaulum* are generally treated as a group because of their life form, similar environmental requirements, and apparently similar behavior under grazing.

## Variation Within Strata

As mentioned previously, vegetation structure was an important element considered in development of the classification. Composition of the tree stratum, tall and low shrub strata, and the herb stratum were considered individually. Some communities contained all four strata. Others would lack tall shrubs, low shrubs, or both. Generalized composition similarities within a given stratum (indicated by a given epithet species or guild) tend to be repeated under different higher level strata. For example, an herbaceous stratum identified by the tall forb epithet can be found under various tree cover types and with or without tall and low shrub strata.

A further generalization of aspen forests within the Intermountain Region can be conveyed by examining the proportion of stands that have similar composition within each vegetation stratum (table 3). The most commonly encountered tree cover type was one consisting of aspen with less than 10 percent cover of a single conifer species. *Abies lasiocarpa* was the most common conifer associated with aspen in the tree layer; this combination formed the *Populus tremuloides—A. lasiocarpa* cover type in almost 12 percent of the stands sampled. A wide variety of other mixed aspen-conifer cover types occurred but were not nearly as common.

A tall shrub stratum occurred in only about a fifth of the stands sampled in the Region (table 3). This stratum was usually characterized by *Amelanchier alnifolia* or *Prunus virginiana*, or both; *A. alnifolia* was used as the epithet in the type names. In a few instances, *Salix scouleriana* was an abundant tall shrub that was used as the epithet.

Half of the aspen stands in the Region contained a conspicuous layer of low shrubs. Usually *Symphoricarpos oreophilus* was the conspicuous element in this stratum and consequently was used as the epithet. *Juniperus communis* was the next most abundant and characterizing shrub and was used as an epithet in about 5 percent of the aspen communities. Several other low shrubs characterized different environmental situations and were used as epithet species, but they were relatively uncommon.

The herbaceous stratum of aspen communities in the Region was most often characterized by members of the tall forb group. Almost a third of the communities sampled contained this type of undergrowth and carried the tall forb epithet in the community type name. About 14 percent of the communities were characterized by a low forb complex in which *Thalictrum fendleri* was usually the most constantly occurring species and therefore used as the epithet. Almost equally abundant were communities in which the graminoids *Calamagrostis rubescens* or *Carex geyeri* or both tended to dominate the herbaceous undergrowth. Frequently, these communities did not contain a great diversity of other undergrowth species. Usually, the epithet *C. rubescens* was used. However, where only *C. geyeri* occurred in a community type, it was used as the epithet. *Bromus carinatus* (along with its guild associates *Elymus glaucus* and *Agropyron trachycaulum*) was considered a characterizing species in approximately 9 percent of the communities and the sedge *Carex rossii* the epithetic species in 6 percent. Eight other species characterized different herbaceous undergrowth conditions, but their occurrence was relatively infrequent (table 3).

**Table 3**—Epithet species or guilds by vegetation structure classes used in the classification of aspen forests in the Intermountain Region, and the proportion of stands in the Region typified by each

| Strata and epithet | Percent of stands |
|---|---|
| **Tree stratum:** | |
| *Populus tremuloides* | 78.4 |
| *P. tremuloides—Abies lasiocarpa* | 11.5 |
| *P. tremuloides—Pinus contorta* | 3.0 |
| *P. tremuloides—Pseudotsuga menziesii* | 2.6 |
| *P. tremuloides—Abies concolor* | 2.5 |
| *P. tremuloides—Pinus ponderosa* | .9 |
| *P. tremuloides—Picea pungens* | .7 |
| *P. tremuloides—Pinus flexilis* | .4 |
| **Tall shrub stratum:** | |
| (none) | 83.3 |
| *Amelanchier alnifolia* | 16.1 |
| *Salix scouleriana* | .6 |
| **Low shrub stratum:** | |
| (none) | 49.5 |
| *Symphoricarpos oreophilus* | 41.6 |
| *Juniperus communis* | 5.3 |
| *Artemisia tridentata* | 1.3 |
| *Shepherdia canadensis* | 1.1 |
| *Sambucus racemosa* | .6 |
| *Arctostaphylos patula* | .4 |
| *Rubus parviflorus* | .2 |
| **Herb stratum:** | |
| Tall Forb | 31.8 |
| *Thalictrum fendleri* | 14.3 |
| (none) | 13.4 |
| *Calamagrostis rubsecens* | 12.6 |
| *Bromus carinatus* | 8.7 |
| *Carex rossii* | 6.0 |
| *Poa pratensis* | 3.4 |
| *Carex geyeri* | 2.6 |
| *Wyethia amplexicaulis* | 1.8 |
| *Festuca thurberi* | 1.2 |
| *Astragalus miser* | 1.2 |
| *Pteridium aquilinum* | 1.1 |
| *Stipa comata* | .8 |
| *Lupinus argenteus* | .7 |
| *Veratrum californicum* | .4 |

## Production Variability

The amount of variation encountered in stand structure and composition is exemplified by the variation in productivity of aspen forests within the Intermountain Region (appendix G). The basal area of aspen trees ranged from 14 to 342 $ft^2$/acre (3.3 to 78.4 $m^2$/ha) and averaged 138 $ft^2$/acre (31.7 $m^2$/ha). Estimated total volume growth of aspen per year ranged from 4 to 76 $ft^3$/acre (0.3 to 5.3 $m^3$/ha) and averaged 38 $ft^3$/acre (2.7 $m^3$/ha). This extreme variability in wood production is again evidence of aspen's ability to dominate, even though temporarily, sites of widely differing quality.

Total annual dry weight of undergrowth herbage varied from a low of less than 10 lb/acre (11 kg/ha) to 3,800 lb/acre (4,260 kg/ha). The average production for all sampled stands in the Region was 976 lb/acre (1,094 kg/ha). Production by vegetation classes differed greatly from stand to stand but overall averaged approximately 14 percent shrubs, 30 percent graminoids, 53 percent forbs, and 3 percent annuals. In many stands a shrub component was either absent or less than 1 percent. In other stands, those that were severely overgrazed for extended periods, the amount of perennial forbs was generally reduced and the proportion of annuals or graminoids increased. Seral aspen stands in advanced stages of succession to conifers usually contained much less undergrowth production than did the stable stands. As a general rule, production of herbaceous and shrubby undergrowth gradually decreased as conifer cover increased in the overstory layer. This decrease usually became pronounced when conifers were as little as 15 percent of the overstory basal area (Mueggler 1985b).

The undergrowth of the Region's aspen communities usually ranks as fairly high-quality livestock forage. The proportion of production in the "desirable" suitability class ranged between community types from a low of 23 percent to a high of 76 percent and averaged 59 percent (as judged by USDA Forest Service 1981). Undergrowth considered as "least desirable" quality ranged from a low of 1 percent to a high of 51 percent, and averaged only 9 percent of the total undergrowth production. On the average, 32 percent of the undergrowth was considered of "intermediate" quality.

## THE CLASSIFICATION

This classification partitions those forests in the Intermountain Region where aspen is at least 50 percent of the tree canopy into eight cover types based on the dominant and codominant trees in the stand. These cover types are then broken into 56 aspen community types based on common indicator species, or species guilds, in the undergrowth. Table 4 provides a listing of these cover types and the community types within each. The *Populus tremuloides* cover type is the most diverse and contains well over half the total community types. For convenience, this cover type was further divided into three undergrowth types based on undergrowth structure: the herb undergrowth type consists of communities without a definite shrub stratum; the low shrub type consists of communities with a low shrub component but without a tall shrub stratum; and the tall shrub type contains those communities with a tall shrub component but may or may not have a low shrub stratum.

The seven mixed aspen-conifer cover types are partitioned into relatively few community types. The most diverse of these cover types is that where *Abies lasiocarpa* shares the overstory with aspen; 10 community types occur within this cover type. Three cover types are recognized that were not further partitioned into distinct community types: those where aspen shared the tree stratum with either *Picea pungens, Pinus flexilis,* or *Pinus ponderosa.*

Although a large number of separate community types were identified and named, comparatively few of these are used to classify the bulk of the aspen communities encountered in the Region. Only 14 community types are required to classify almost two-thirds of the stands. Four-fifths of the stands fall into only 26 community types. Thus, over half of the community types identified, although considered distinct entities, are seldom encountered. The 59 aspen types were therefore grouped into three categories according to their sampled abundance within the Region (table 5). Those considered to be "major" community types (14 in all) are those described on the basis of at least 40 stands in each. These form the bulk of the aspen stands within the Region. The "minor" community types are those that were described on the basis of 20 to 40 stands in each type. And the "incidental" types are those that were described on the basis of less than 20 stands in each type. Some of the latter types were described by only four to seven stands but were distinctly unique. In contrast, the most common type, the *Populus tremuloides*/Tall Forb community type, was described on the basis of 228 stands. The incidental community types are seldom seen in the Region as a whole, although some may be more frequent in some areas than in others. The distribution of the individual community types is discussed under the type descriptions.

Some of the community types are obviously successional to coniferous forests. Others appear to represent situations where intense and prolonged past grazing has had a major effect on composition of the undergrowth. Although the climax status of a good portion of the types is uncertain, many appear to be relatively stable and are so identified. In some instances, they may approximate actual climax community types and thus represent habitat types. In others, they may represent situations that will eventually succeed to coniferous forest even though little evidence exists at present to verify this possibility. In most cases, these types probably have been altered by grazing but are still basically reflecting abiotic environmental influences. Table 5 includes a breakdown of the types by their perceived successional status.

### Use of Vegetation Key

The key to the community types (see next section) first places the community to be classified into its proper cover type. This is dependent upon a judgment of the amounts of various conifer species present in the tree stratum. The canopy cover estimate of the conifer species should include that of reproduction as well as that of the amount in the overstory. Different conifer species are given sequential consideration primarily on the basis of their susceptibility to moisture stress. Those species that require the less stressful moist sites are broken out first, and those able to occupy the driest sites last. The minimum amount of cover of a single conifer species necessary to define a specific aspen-conifer cover type is set at 10 percent. This amount was subjectively judged to be more than accidental and to approximate the level required for a conifer species to validly indicate site differences and successional trends to conifer dominance.

For convenience, the *Populus tremuloides* cover type, which contains 35 community types, is further subdivided into undergrowth categories. Those communities possessing critical amounts of selected tall shrub species are placed in a tall shrub category. Those that do not meet this criterion but have a distinct layer of low shrub species are placed in the low shrub category. Communities that lack a well-defined component of shrubs are placed within the herb undergrowth category.

Table 4—Aspen community types within the Intermountain Region by overstory cover types

| Cover type and community type | Abbreviation |
|---|---|
| ***Populus tremuloides* cover type:** | |
| Herb undergrowth types | |
| *P. tremuloides/Veratrum californicum* | POTR/VECA |
| *P. tremuloides/Pteridium aquilinum* | POTR/PTAQ |
| *P. tremuloides/Wyethia amplexicaulis* | POTR/WYAM |
| *P. tremuloides/Festuca thurberi* | POTR/FETH |
| *P. tremuloides*/Tall Forb | POTR/TALL FORB |
| *P. tremuloides/Calamagrostis rubescens* | POTR/CARU |
| *P. tremuloides/Thalictrum fendleri* | POTR/THFE |
| *P. tremuloides/Bromus carinatus* | POTR/BRCA |
| *P. tremuloides/Carex rossii* | POTR/CARO |
| *P. tremuloides/Stipa comata* | POTR/STCO |
| *P. tremuloides/Astragalus miser* | POTR/ASMI |
| *P. tremuloides/Poa pratensis* | POTR/POPR |
| Low shrub undergrowth types | |
| *P. tremuloides/Rubus parviflorus* | POTR/RUPA |
| *P. tremuloides/Sambucus racemosa* | POTR/SARA |
| *P. tremuloides/Shepherdia canadensis* | POTR/SHCA |
| *P. tremuloides/Symphoricarpos oreophilus*/Tall Forb | POTR/SYOR/TALL FORB |
| *P. tremuloides/S. oreophilus/Calamagrostis rubescens* | POTR/SYOR/CARU |
| *P. tremuloides/S. oreophilus/Thalictrum fendleri* | POTR/SYOR/THFE |
| *P. tremuloides/S. oreophilus/Festuca thurberi* | POTR/SYOR/FETH |
| *P. tremuloides/S. oreophilus/Carex rossii* | POTR/SYOR/CARO |
| *P. tremuloides/S. oreophilus/Wyethia amplexicaulis* | POTR/SYOR/WYAM |
| *P. tremuloides/S. oreophilus/Bromus carinatus* | POTR/SYOR/BRCA |
| *P. tremuloides/S. oreophilus/Poa pratensis* | POTR/SYOR/POPR |
| *P. tremuloides/Juniperus communis/Carex geyeri* | POTR/JUCO/CAGE |
| *P. tremuloides/J. communis/Lupinus argenteus* | POTR/JUCO/LUAR |
| *P. tremuloides/J. communis/Astragalus miser* | POTR/JUCO/ASMI |
| *P. tremuloides/Artemisia tridentata* | POTR/ARTR |
| Tall shrub undergrowth types | |
| *P. tremuloides/Salix scouleriana* | POTR/SASC |
| *P. tremuloides/Amelanchier alnifolia—Symphoricarpos oreophilus*/Tall Forb | POTR/AMAL-SYOR/TALL FORB |
| *P. tremuloides/A. alnifolia—S. oreophilus/Thalictrum fendleri* | POTR/AMAL-SYOR/THFE |
| *P. tremuloides/A. alnifolia—S. oreophilus/Calamagrostis rubescens* | POTR/AMAL-SYOR/CARU |
| *P. tremuloides/A. alnifolia—S. oreophilus/Bromus carinatus* | POTR/AMAL-SYOR/BRCA |
| *P. tremuloides/A. alnifolia/Pteridium aquilinum* | POTR/AMAL/PTAQ |
| *P. tremuloides/A. alnifolia*/Tall Forb | POTR/AMAL/TALL FORB |
| *P. tremuloides/A. alnifolia/Thalictrum fendleri* | POTR/AMAL/THFE |
| ***Populus tremuloides—Abies lasiocarpa* cover type:** | |
| *P. tremuloides—A. lasiocarpa*/Tall Forb | POTR-ABLA/TALL FORB |
| *P. tremuloides—A. lasiocarpa/Thalictrum fendleri* | POTR-ABLA/THFE |
| *P. tremuloides—A. lasiocarpa/Carex geyeri* | POTR-ABLA/CAGE |
| *P. tremuloides—A. lasiocarpa/Carex rossii* | POTR-ABLA/CARO |
| *P. tremuloides—A. lasiocarpa/Shepherdia canadensis* | POTR-ABLA/SHCA |
| *P. tremuloides—A. lasiocarpa/Symphoricarpos oreophilus*/Tall Forb | POTR-ABLA/SYOR/TALL FORB |
| *P. tremuloides—A. lasiocarpa/S. oreophilus/Thalictrum fendleri* | POTR-ABLA/SYOR/THFE |
| *P. tremuloides—A. lasiocarpa/S. oreophilus/Bromus carinatus* | POTR-ABLA/SYOR/BRCA |
| *P. tremuloides—A. lasiocarpa/Juniperus communis* | POTR-ABLA/JUCO |
| *P. tremuloides—A. lasiocarpa/Amelanchier alnifolia* | POTR-ABLA/AMAL |
| ***Populus tremuloides—Pinus contorta* cover type:** | |
| *P. tremuloides—P. contorta/Thalictrum fendleri* | POTR-PICO/THFE |
| *P. tremuloides—P. contorta/Carex geyeri* | POTR-PICO/CAGE |
| *P. tremuloides—P. contorta/Symphoricarpos oreophilus* | POTR-PICO/SYOR |
| *P. tremuloides—P. contorta/Juniperus communis* | POTR-PICO/JUCO |
| ***Populus tremuloides—Pseudotsuga menziesii* cover type:** | |
| *P. tremuloides—P. menziesii/Calamagrostis rubescens* | POTR-PSME/CARU |
| *P. tremuloides—P. menziesii/Symphoricarpos oreophilus* | POTR-PSME/SYOR |
| *P. tremuloides—P. menziesii/Juniperus communis* | POTR-PSME/JUCO |
| *P. tremuloides—P. menziesii/Amelanchier alnifolia* | POTR-PSME/AMAL |

(con.)

Table 4 (Con.)

| Cover type and community type | Abbreviation |
|---|---|
| ***Populus tremuloides—Abies concolor* cover type:** | |
| *P. tremuloides—A. concolor/Poa pratensis* | POTR-ABCO/POPR |
| *P. tremuloides—A. concolor/Symphoricarpos oreophilus* | POTR-ABCO/SYOR |
| *P. tremuloides—A. concolor/Arctostaphylos patula* | POTR-ABCO/ARPA |
| ***Populus tremuloides—Picea pungens* cover type.** | POTR-PIPU |
| ***Populus tremuloides—Pinus flexilis* cover type.** | POTR-PIFL |
| ***Populus tremuloides—Pinus ponderosa* cover type.** | POTR-PIPO |

Table 5—Aspen community types within the Intermountain Region by categories of relative abundance (determined by proportions of sampled stands) and general successional status

| Stable types | Seral to conifers | Grazing disclimax |
|---|---|---|
| **Major aspen types** (Estimated 64 percent of Intermountain Region aspen stands): | | |
| POTR/TALLFORB | POTR-ABLA/TALLFORB | POTR/BRCA |
| POTR/CARU | POTR-ABLA/CARO | POTR/SYOR/BRCA |
| POTR/THFE | | |
| POTR/CARO | | |
| POTR/SYOR/TALLFORB | | |
| POTR/SYOR/CARU | | |
| POTR/SYOR/THFE | | |
| POTR/AMAL-SYOR/TALL FORB | | |
| POTR/AMAL-SYOR/THFE | | |
| POTR/AMAL-SYOR/CARU | | |
| **Minor aspen types** (Estimated 16 percent of Intermountain Region aspen stands): | | |
| POTR/WYAM | POTR-ABLA/SYOR/TALLFORB | POTR/POPR |
| POTR/JUCO/CAGE | POTR-ABLA/THFE | POTR/SYOR/POPR |
| POTR/ARTR | POTR-PICO/JUCO | POTR/AMAL-SYOR/BRCA |
| POTR/AMAL/THFE | POTR-ABCO/SYOR | |
| POTR/AMAL/TALL FORB | | |
| **Incidental aspen types** (Estimated 20 percent of Intermountain Region aspen stands): | | |
| POTR/VECA | POTR-ABLA/SHCA | POTR/ASMI |
| POTR/PTAQ | POTR-ABLA/AMAL | POTR/JUCO/ASMI |
| POTR/FETH | POTR-ABLA/SYOR/THFE | |
| POTR/STCO | POTR-ABLA/SYOR/BRCA | |
| POTR/RUPA | POTR-ABLA/JUCO | |
| POTR/SARA | POTR-ABLA/CAGE | |
| POTR/SYOR/FETH | POTR-PICO/THFE | |
| POTR/SYOR/CARO | POTR-PICO/SYOR | |
| POTR/SYOR/WYAM | POTR-PICO/CAGE | |
| POTR/JUCO/LUAR | POTR-PSME/AMAL | |
| POTR/SASC | POTR-PSME/SYOR | |
| POTR/AMAL/PTAQ | POTR-PSME/JUCO | |
| POTR/SHCA | POTR-PSME/CARU | |
| | POTR-ABCO/ARPA | |
| | POTR-ABCO/POPR | |
| | POTR-PIPU | |
| | POTR-PIFL | |
| | POTR-PIPO | |

The key then proceeds to define community types on the basis of presence of critical amounts of key indicator species or guilds of species. Once a community type designation is identified, the description of the type in the text and the composition given in appendix F should be reviewed to validate the identification. Immediately following the type designation in the key, the abundance status of the type (whether major, minor, or incidental) and the page number where the type is described narratively are given in parentheses. Approximately 5 percent of the stands that would likely be encountered in the Intermountain Region cannot be classified by using this key. These should fall out in the key as "Unclassified types."

Type descriptions are arranged by abundance groups with the most common types described first and least common types last. Each description includes information on where the type was observed, environmental factors, community structure and species composition, estimated successional status, productivity, and miscellaneous. In the key and descriptions, the term "community type" is abbreviated to "c.t." and in the plural form to "c.t.'s".

A field form (appendix F) has been prepared to facilitate collection of the information needed for classifying aspen stands into their respective community types. This form includes a listing of only those plant species needed to define the type. The list consists of nine tree species, 14 shrubs, 12 graminoids, and 18 forbs. Data can be gathered and entered onto this form in the field and subsequently keyed to the appropriate type. Preferably, keying should take place while in the field to enable reevaluation of cover estimates if uncertainties are encountered in using the key.

## Keys to Cover Types and Community Types

These keys cover vegetation in aspen community types (c.t.'s) in the Intermountain Region where *Populus tremuloides* constitutes at least 50 percent of the tree canopy. Note that the "tall forb group" referred to consists of the following species:

*Agastache urticifolia*
*Aster engelmannii*
*Delphinium occidentale*+
*Hackelia floribunda*
*Heracleum lanatum*
*Mertensia arizonica*+
*Osmorhiza occidentalis*
*Senecio serra* +
*Valeriana occidentalis*

The adjective descriptors are:

trace = less than 1 percent cover
scarce, present, readily apparent = 1 percent to 4 percent cover
conspicuous = 5 percent or greater cover
prominent = 10 percent or greater cover

The type abundance and page number of narrative description follow community type name. For example: (major, p. 68).

### Key to Cover Types:

I. *Abies lasiocarpa* or *Picea engelmannii* or both at least 10 percent canopy cover ........ *Populus tremuloides-Abies lasiocarpa* (Go to B in "Community Type" section)

I. *A. lasiocarpa* and *P. engelmannii* less than 10 percent cover ........ II

  II. *Pinus contorta* at least 10 percent canopy cover ........ *Populus tremuloides-Pinus contorta* (Go to C)

  II. *P. contorta* less than 10 percent cover ........ III

III. *Pseudotsuga menziesii* at least 10 percent canopy cover ........ *Populus tremuloides-Pseudotsuga menziesii* (Go to D)

III. *P. menziesii* less than 10 percent cover ........ IV

  IV. *Abies concolor* at least 10 percent canopy cover ........ *Populus tremuloides-Abies concolor* (Go to E)

  IV. *A. concolor* less than 10 percent cover ........ V

V. *Picea pungens* at least 10 percent canopy cover ........ *Populus tremuloides-Picea pungens* (inciden., p. 78)

V. *P. pungens* less than 10 percent cover ........ VI

  VI. *Pinus flexilis* at least 10 percent canopy cover ........ *Populus tremuloides-Pinus flexilis* (inciden., p. 79)

  VI. *P. flexilis* less than 10 percent cover ........ VII

VII. *Pinus ponderosa* at least 10 percent canopy cover ........ *Populus tremuloides-Pinus ponderosa* (inciden., p. 79)

VII. *P. ponderosa* less than 10 percent cover ........ VIII

  VIII. Some other coniferous trees at least 10 percent canopy cover ........ Unclassified cover type

  VIII. Not as above ........ *Populus tremuloides* (Go to A)

### Key to Community Types:

**A. *POPULUS TREMULOIDES* cover type**

1. *Amelanchier alnifolia*, *Prunus virginiana*, *Acer grandidentatum* or *Salix scouleriana*, alone or in combination, prominent, generally exceeding 10 percent canopy cover ........ Tall Shrub Undergrowth Type (Go to AA)

1. Above-named shrubs totaling less than 10 percent cover ........ 2

  2. *Symphoricarpos oreophilus*, *Pachystima myrsinites*, and *Rosa* spp., alone or in combination, prominent with at least 10 percent canopy cover; or, *Juniperus communis*, *Artemisia tridentata*, *Shepherdia canadensis*, *Sambucus* spp., or *Rubus parviflorus* with at least 10 percent canopy cover ........ Low Shrub Undergrowth Type (Go to AB)

  2. Not as above ........ Herb Undergrowth Type (Go to AC)

**AA. Tall Shrub Undergrowth Type**

1. *Salix scouleriana* prominent tall shrub with at least 10 percent canopy cover ........ *Populus tremuloides/Salix scouleriana* c.t. (inciden., p. 59)

1. *S. scouleriana* absent, or may be present in lesser amounts than above ........ 2

  2. *Pteridium aquilinum* conspicuous with at least 5 percent cover, and usually in excess of 20 percent cover ........ *Populus tremuloides/Amelanchier alnifolia/Pteridium aquilinum* (inciden., p. 60)

  2. *P. aquilinum* absent or scarce ........ 3

3. *Symphoricarpos oreophilus*, *Pachystima myrsinites*, *Rosa* spp., or *Spiraea betulifolia*, alone or in combination, prominent low shrubs, usually with combined canopy cover substantially exceeding 10 percent ........ 4

3. Not as above ........ 8

  4. One or more members of the tall forb group (see key caption) prominent, alone or in combination, forming at least 10 percent cover; or tall forbs readily apparent in a sparse herbaceous layer ........ *Populus tremuloides/Amelanchier alnifolia-Symphoricarpos oreophilum*/Tall Forb c.t. (major, p. 25)

4. Tall forbs absent, or relatively inconspicuous .... 5

5. *Calamagrostis rubescens* or *Carex geyeri* or both prominent with at least 10 percent and frequently more than 20 percent canopy cover .... *Populus tremuloides/Amelanchier alnifolia-Symphoricarpos oreophilus/Calamagrostis rubescens* c.t. (major, p. 31)

5. Not as above .... 6

6. *Thalictrum fendleri, Osmorhiza chilensis*, or *Geranium viscosissimum*, alone or in combination, prominent, generally exceeding 10 percent cover .... *Populus tremuloides/Amelanchier alnifolia-Symphoricarpos oreophilus/Thalictrum fendleri* c.t. (major, p. 36)

6. Above-named species absent or scarce .... 7

7. *Bromus carinatus, Elymus glaucus*, and *Agropyron trachycaulum*, alone or in combination, conspicuous, generally exceeding 5 percent cover .... *Populus tremuloides/Amelanchier alnifolia-Symphoricarpos oreophilus/Bromus carinatus* c.t. (minor, p. 51)

7. Not as above .... Unclassified type

8. One or more members of the tall forb group (see key caption), alone or in combination, prominent forming at least 10 percent cover, or tall forbs readily apparent in a sparse herbaceous layer .... *Populus tremuloides/Amelanchier alnifolia/* Tall Forb c.t. (minor, p. 50)

8. Tall forbs absent or inconspicuous .... 9

9. *Thalictrum fendleri, Osmorhiza chilensis*, or *Geranium viscosissimum*, alone or in combination, prominent with at least 10 percent total canopy cover .... *Populus tremuloides/Amelanchier alnifolia/Thalictrum fendleri* c.t. (minor p. 50)

9. Not as above .... Unclassified type

**AB. Low Shrub Undergrowth Type**

1. *Rubus parviflorus* abundant with canopy cover exceeding 30 percent .... *Populus tremuloides/Rubus parviflorus* c.t. (inciden., p. 57)

1. *R. parviflorus* may be present, but not an undergrowth dominant .... 2

2. *Sambucus* spp. a prominent shrub with at least 10 percent canopy cover; members of the tall forb group frequently abundant .... *Populus tremuloides/Sambucus racemosa* c.t. (inciden., p. 57)

2. *Sambucus* spp. absent or scarce; if present, then less than 10 percent cover .... 3

3. *Shepherdia canadensis* prominent with at least 10 percent cover .... *Populus tremuloides/Shepherdia canadensis* c.t. (inciden., p. 68)

3. *S. canadensis* absent or scarce .... 4

4. *Artemisia tridentata* prominent with at least 10 percent canopy cover .... *Populus tremuloides/Artemisia tridentata* c.t. (minor, p. 44)

4. *A. tridentata* absent or scarce, less than 10 percent cover .... 5

5. *Juniperus communis* prominent with at least 10 percent cover .... 6

5. *J. communis* absent, or present with less than 10 percent cover .... 9

6. *Carex geyeri* or *Calamagrostis rubescens* prominent, at least 10 percent cover and usually more .... *Populus tremuloides/Juniperus communis/Carex geyeri* c.t. (minor, p. 46)

6. *C. geyeri* and *C. rubescens* usually absent; if present, then not prominent .... 7

7. *Lupinus argenteus* prominent, or at least readily apparent if the herb layer is sparse .... *Populus tremuloides/Juniperus communis/Lupinus argenteus* c.t. (inciden., p. 66)

7. Not as above .... 8

8. *Astragalus miser* prominent, or readily apparent if the herb layer is sparse .... *Populus tremuloides/Juniperus communis/Astragalus miser* c.t. (inciden., p. 66)

8. Not as above .... Unclassified type

9. *Symphoricarpos oreophilus, Pachystima myrsinites*, or *Rosa* spp., alone or in combination, prominent with at least 10 percent cover .... 10

9. Not as above .... (Go to AC)

10. *Wyethia amplexicaulis* conspicuous, usually with cover exceeding 10 percent .... *Populus tremuloides/Symphoricarpos oreophilus/Wyethia amplexicaulis* c.t. (inciden., p. 64)

10. *W. amplexicaulis* absent or scarce .... 11

11. *Festuca thurberi* conspicuous, usually exceeding 10 percent cover .... *Populus tremuloides/Symphoricarpos oreophilus/Festuca thurberi* c.t. (inciden., p. 62)

11. *F. thurberi* absent or scarce .... 12

12. One or more tall forbs (see key caption) prominent, alone or in combination forming at least 10 percent cover; or tall forbs readily apparent in a sparse herbaceous stratum .......... *Populus tremuloides/Symphoricarpos oreophilus*/Tall Forb c.t. (major, p. 23)

12. Tall forbs absent or inconspicuous .......... 13

13. *Calamagrostis rubescens* or *Carex geyeri* prominent with at least 10 percent cover; or, forming a conspicuous part of a sparse herbaceous stratum .......... *Populus tremuloides/Symphoricarpos oreophilus/Calamagrostis rubescens* c.t. (major, p. 30)

13. *C. rubescens* and *C. geyeri* absent or not readily apparent .......... 14

14. *Thalictrum fendleri*, *Osmorhiza chilensis*, or *Geranium viscosissimum*, alone or in combination, prominent, usually exceeding 10 percent cover; or a conspicuous element in a sparse herb stratum .......... *Populus tremuloides/Symphoricarpos oreophilus/Thalictrum fendleri* c.t. (major, p. 35)

14. These low forbs absent or scarce, not comprising a conspicuous part of the undergrowth .......... 15

15. *Bromus carinatus, Elymus glaucus*, or *Agropyron trachycaulum*, alone or in combination, prominent, usually with more than 10 percent canopy cover; or a conspicuous element in a somewhat sparse herb stratum .......... *Populus tremuloides/Symphoricarpos oreophilus/Bromus carinatus* c.t. (major, p. 42)

15. Not as above .......... 16

16. *Carex rossii* or *Bromus anomalus*, alone or combined, form a conspicuous part of a rather sparse herb stratum .......... *Populus tremuloides/Symphoricarpos oreophilus/Carex rossii* c.t. (inciden., p. 63)

16. *C. rossii* and *B. anomalus* absent or inconspicuous .......... 17

17. *Poa pratensis* prominent and usually the dominant herbaceous plant .......... *Populus tremuloides/Symphoricarpos oreophilus/Poa pratensis* c.t. (minor, p. 49)

17. Not as above .......... Unclassified type

**AC. Herb Undergrowth Type**

1. *Veratrum californicum* prominent, generally exceeding 10 percent canopy cover .......... *Populus tremuloides/Veratrum californicum* c.t. (inciden., p. 56)

1. *V. californicum* absent or scarce .......... 2

2. *Pteridium aquilinum* prominent with at least 10 percent canopy cover; usually exceeds 20 percent cover .......... *Populus tremuloides/Pteridium aquilinum* c.t. (inciden., p. 59)

2. *P. aquilinum* either absent or scarce .......... 3

3. *Wyethia amplexicaulis* prominent with at least 10 percent cover; usually exceeds 20 percent cover .......... *Populus tremuloides/Wyethia amplexicaulis* c.t. (minor, p. 43)

3. *W. amplexicaulis* absent or scarce .......... 4

4. *Festuca thurberi* a conspicuous member of the undergrowth with usually more than 5 percent cover .......... *Populus tremuloides/Festuca thurberi* c.t. (inciden., p. 61)

4. *F. thurberi* absent or inconspicuous .......... 5

5. One or more members of the tall forb group (see key caption) prominent, alone or in combination at least 10 percent cover .......... *Populus tremuloides*/Tall Forb c.t. (major, p. 20)

5. Tall forbs, if present, form less than 10 percent canopy cover .......... 6

6. *Calamagrostis rubescens* or *Carex geyeri* prominent with at least 10 percent cover, usually more .......... *Populus tremuloides/Calamagrostis rubescens* c.t. (major, p. 28)

6. C. *rubescens* and *C. geyeri* absent or scarce .......... 7

7. *Thalictrum fendleri*, *Geranium viscosissimum*, or *Osmorhiza chilensis*, alone or in combination, prominent with at least 10 percent cover .......... *Populus tremuloides/Thalictrum fendleri* c.t. (major, p. 33)

7. Not as above .......... 8

8. *Carex rossii* or *Bromus anomalus* or both usually prominent with at least 10 percent cover, or conspicuous in a sparse perennial undergrowth .......... *Populus tremuloides/Carex rossii* c.t. (major, p. 38)

8. Above species absent or inconspicuous .......... 9

9. *Bromus carinatus, Elymus glaucus*, or *Agropyron trachycaulum*, alone or in combination, usually prominent with at least 10 percent cover .......... *Populus tremuloides/Bromus carinatus* c.t. (major, p. 40)

9. Above grasses absent or not conspicuous .......... 10

10. *Poa pratensis* dominates undergrowth ........ *Populus tremuloides/Poa pratensis* c.t. (minor, p. 47)

10. *P. pratensis* may be present, but does not dominate the undergrowth ........ 11

11. *Stipa comata, Festuca idahoensis*, or *Sitanion hysterix*, alone or in combination, prominent ........ *Populus tremuloides/Stipa comata* c.t. (inciden., p. 67)

11. Above grasses absent or inconspicuous ........ 12

12. *Astragalus miser* prominent, usually with more than 10 percent cover, or conspicuous in sparse undergrowth ........ *Populus tremuloides/Astragalus miser* c.t. (inciden., p. 64)

12. *A. miser* absent or inconspicuous ........ 13

13. One or more members of the tall forb group form a conspicuous part of rather sparse perennial undergrowth ........ *Populus tremulcides*/Tall Forb c.t. (major, p. 20)

13. Tall forbs not conspicuous ........ 14

14. *Thalictrum fendleri, Osmorhiza chilensis*, or *Geranium viscosissimum*, alone or in combination, readily apparent in rather sparse undergrowth ........ *Populus tremuloides/Thalictrum fendleri* c.t. (major, p. 33)

14. Above forbs inconspicuous ........ 15

15. *Bromus carinatus, Elymus glaucus*, or *Agropyron trachycaulum*, alone or in combination, readily apparent in rather sparse perennial undergrowth ........ *Populus tremuloides/Bromus carinatus* c.t. (major, p. 40)

15. Not as above ........ Unclassified type

B. ***POPULUS TREMULOIDES—ABIES LASIOCARPA* cover type**

1. *Shepherdia canadensis* prominent, at least 10 percent cover ........ *Populus tremuloides-Abies lasiocarpa/ Shepherdia canadensis* c.t. (inciden., p. 68)

1. *S. canadensis* absent or scarce ........ 2

2. *Amelanchier alnifolia, Prunus virginiana*, or *Acer grandidentatum* prominent, alone or in combination, at least 10 percent canopy cover; *Symphoricarpos* spp. usually prominent ........ *Populus tremuloides-Abies lasiocarpa/ Amelanchier alnifolia* c.t. (inciden., p. 69)

2. Not as above ........ 3

3. *Juniperus communis* conspicuous and usually prominent; *Bromus anomalus* or *Carex rossii* often present ........ *Populus tremuloides-Abies lasiocarpa/ Juniperus communis* c.t. (inciden., p. 71)

3. *J. communis* absent or scarce ........ 4

4. *Symphoricarpos* spp., *Pachystima myrsinites*, or *Rosa* spp., alone or in combination, prominent with at least 10 percent canopy cover ........ 5

4. Not as above ........ 8

5. One or more members of the tall forb group (see key caption), alone or in combination, prominent, or at least forming a conspicuous part of the undergrowth ........ *Populus tremuloides-Abies lasiocarpa/ Symphoricarpos oreophilus/* Tall Forb c.t. (minor, p. 52)

5. Tall forbs not a conspicuous part of the undergrowth ........ 6

6. *Thalictrum fendleri, Osmorhiza chilensis*, or *Geranium viscosissimum*, alone or in combination, prominent, or at least forming a conspicuous part of the undergrowth ........ *Populus tremuloides-Abies lasiocarpa/ Symphoricarpos oreophilus/ Thalictrum fendleri* c.t. (inciden., p. 70)

6. Not as above ........ 7

7. *Bromus carinatus, Elymus glaucus*, or *Agropyron trachycaulum*, alone or in combination, prominent with at least 10 percent canopy cover ........ *Populus tremuloides-Abies lasiocarpa/ Symphoricarpos oreophilus/Bromus carinatus* c.t. (inciden., p. 70)

7. Not as above ........ Unclassified *Populus-Abies* cover type

8. One or more members of the tall forb group (see key caption), alone or in combination, prominent, or at least forming a conspicuous part of the undergrowth ........ *Populus tremuloides-Abies lasiocarpa/* Tall Forb c.t. (major, p. 26)

8. Tall forbs not a conspicuous part of the undergrowth ........ 9

9. *Carex geyeri* or *Calamagrostis rubescens* usually prominent, but may be only conspicuous if other undergrowth is sparse ........ *Populus tremuloides-Abies lasiocarpa/ Carex geyeri* c.t. (inciden., p. 71)

9. Neither *C. geyeri* nor *C. rubescens* conspicuous ........ 10

10. *Thalictrum fendleri*, *Osmorhiza chilensis*, or *Geranium viscosissimum*, alone or in combination, usually prominent, but at least conspicuous ............ *Populus tremuloides-Abies lasiocarpa/ Thalictrum fendleri* c.t. (minor, p. 53)

10. Not as above ............ 11

11. *Carex rossii*, *Bromus anomalus*, or *Trifolium* spp. form a conspicuous part of a generally sparse undergrowth ............ *Populus tremuloides-Abies lasiocarpa/ Carex rossii* c.t. (major, p. 39)

11. Not as above ............ Unclassified *Populus-Abies* cover type

C. ***POPULUS TREMULOIDES—PINUS CONTORTA* cover type**

1. *Symphoricarpos* spp., *Rosa* spp., or *Pachystima myrsinites*, alone or in combination, prominent with at least 10 percent canopy cover ............ *Populus tremuloides-Pinus contorta/ Symphoricarpos oreophilus* c.t. (inciden., p. 72)

1. Above species may be present, but not prominent ............ 2

2. *Juniperus communis* conspicuous and usually prominent; *Carex geyeri* or *Astragalus miser* frequently present ............ *Populus tremuloides-Pinus contorta/Juniperus communis* c.t. (minor, p. 54)

2. Not as above ............ 3

3. *Carex geyeri* or *Calamagrostis rubescens* prominent, usually exceeding 10 percent canopy cover ............ *Populus tremuloides-Pinus contorta/ Carex geyeri* c.t. (inciden., p. 73)

3. Above graminoids may be present, but not a prominent part of the undergrowth ............ 4

4. *Thalictrum fendleri*, *Osmorhiza chilensis*, or *Geranium viscosissimum*, alone or in combination, a conspicuous element of the undergrowth ............ *Populus tremuloides-Pinus contorta/ Thalictrum fendleri* c.t. (inciden., p. 73)

4. Not as above ............ Unclassified *Populus-Pinus* cover type

D. ***POPULUS TREMULOIDES—PSEUDOTSUGA MENZIESII* cover type**

1. *Amelanchier alnifolia*, *Prunus virginiana*, or *Acer* spp., alone or in combination, prominent generally exceeding 10 percent canopy cover ............ *Populus tremuloides-Pseudotsuga menziesii/Amelanchier alnifolia* c.t. (inciden., p. 74)

1. Above shrubs absent or scarce ............ 2

2. *Juniperus communis* a prominent low shrub ............ *Populus tremuloides-Pseudotsuga menziesii/Juniperus communis* c.t. (inciden., p. 76)

2. *J. communis* usually absent and never prominent ............ 3

3. *Symphoricarpos* spp., *Pachystima myrsinites*, *Spiraea betulifolia*, or *Rosa* spp., alone or in combination, prominent low shrubs with at least 10 percent canopy cover ............ *Populus tremuloides-Pseudotsuga menziesii/Symphoricarpos oreophilus* c.t. (inciden., p. 75)

3. Above shrubs may be present, but never prominent ............ 4

4. *Calamagrostis rubescens* or *Carex geyeri* abundant with canopy cover generally exceeding 20 percent ............ *Populus tremuloides-Pseudotsuga menziesii/Calamagrostis rubescens* c.t. (inciden., p. 76)

4. Not as above ............ Unclassified *Populus-Pseudotsuga* cover type

E. ***POPULUS TREMULOIDES—ABIES CONCOLOR* cover type**

1. *Arctostaphylos patula* conspicuous and usually prominent ............ *Populus tremuloides-Abies concolor/ Arctostaphylos patula* c.t. (inciden., p. 77)

1. *A. patula* absent or only incidental ............ 2

2. *Symphoricarpos oreophilus*, *Rosa woodsii*, or *Pachystima myrsinites*, alone or in combination, prominent with canopy cover usually exceeding 10 percent ............ *Populus tremuloides-Abies concolor/ Symphoricarpos oreophilus* c.t. (minor, p. 54)

2. Above low shrubs frequently present, but never prominent ............ 3

3. *Poa pratensis* a conspicuous component of the undergrowth, usually comprising over 10 percent of the canopy cover ............ *Populus tremuloides-Abies concolor/ Poa pratensis* c.t. (inciden., p. 77)

3. Not as above ............ Unclassified *Populus-Abies* cover type

## MAJOR ASPEN COMMUNITY TYPES

### *Populus tremuloides*/Tall Forb Community Type (POTR/TALL FORB c.t.)

**Distribution**—The POTR/TALL FORB c.t., the most commonly encountered aspen type in the Intermountain Region, accounted for over 11 percent of all stands classified. The type is most prevalent in northern Utah on the Wasatch-Cache and Uinta National Forests, particularly on the Bear River and Wasatch Mountain ranges and on the west end of the Uinta Mountains. Approximately a fifth of the stands sampled on the Uinta National Forest, 15 percent on the Bridger-Teton and Manti-LaSal National Forests, and 14 percent on the Wasatch-Cache National Forest occurred in this type (appendix C). It is also common on the Jarbidge and Independence mountain ranges in northern Nevada. Of the stands sampled on the Humboldt National Forest 18 percent were in this type. Elsewhere it is widely scattered. Although infrequent south of 39° latitude, it has been observed at mid- to high elevations in the Abajo Mountains in the southeast and on the Markagunt Plateau in southwestern Utah.

This is a mid- to upper elevation type. Three-fourths of the stands were between 7,000 and 9,000 ft (2,100 and 2,750 m) elevation. Although not restricted by exposure, it was most frequent on northerly slopes of gentle to moderate steepness. The type was primarily on landform configurations concave to undulating; few stands were on convex topography. Stands occurred on relatively deep soils derived from sandstone, limestone, quartzite, and granitic parent rock; few grew on volcanic soils.

**Vegetation**—The vegetation of this common type is structurally simple but compositionally complex and variable. The tree layer generally consists only of *Populus tremuloides*. Occasionally, however, small amounts of conifers may be present. *Abies lasiocarpa*, the most common conifer associate, occurred with an average cover of 2 percent in approximately a third of the 228 stands sampled. Although the type lacks a shrub stratum per se, various shrubs may be present in small quantities. In fact, *Symphoricarpos oreophilus* occurred as an incidental shrub in almost two-thirds of the stands, and *Sambucus racemosa* was observed in almost a third of the stands. Consequently, the undergrowth consists almost exclusively of a highly variable and usually lush mixture of a broad range of forbs and graminoids.

The unifying characteristic of the type is the presence and usual prominence of one or more members of the tall forb group of species, the absence of a distinct layer of shrubs, and lack of substantial amounts of conifers in the tree layer (fig. 5). Members of this tall forb guild (and their constancy) are *Valeriana occidentalis* (59), *Osmorhiza occidentalis* (53), *Hackelia floribunda* (51), *Senecio serra* (49), *Agastache urticifolia* (47), *Mertensia arizonica* (33), *Delphinium occidentale* (32), *Aster engelmannii* (21), and *Heracleum lanatum* (12). No one member of this group is consistently prominent or even present, but as a group they usually make up at least 10 percent canopy cover. Occasionally, one tall forb species will overwhelmingly dominate the undergrowth. This is the case in some stands where *M. arizonica* or *H. lanatum* form the bulk of the undergrowth (fig. 6). If a stand has been subjected to extremely abusive grazing, a few members of the tall forb guild will often still be conspicuous in either a

Figure 5—The *Populus tremuloides*/Tall Forb c.t., especially prevalent in northern Utah, is the most common community type in the Intermountain Region. The undergrowth typically consists of a diverse mixture of both tall and low forbs, and robust graminoids.

Figure 6—In contrast to the broad mixture of species in the undergrowth of most stands within the *Populus tremuloides*/Tall Forb c.t., a single tall forb species such as *Heracleum lanatum* will occasionally appear to dominate the undergrowth.

rather sparse undergrowth or intermixed with a dominant low-palatability species such as *Rudbeckia occidentalis*. The tall forb species are usually accompanied by a mixture of low forbs and graminoids. Most common low forbs are *Thalictrum fendleri, Osmorhiza chilensis, Geranium viscosissimum, Stellaria jamesiana,* and *Achillea millefolium*. The most common graminoids in this type are *Bromus carinatus, Elymus glaucus*, and *Agropyron trachycaulum*; at times these tall-growing grasses can be very abundant. Pocket gophers frequently churn the relatively deep, loose soil of this type, providing conditions amply suited for the growth of such annuals as *Nemophila breviflora, Galium bifolium, Collomia linearis, Descurainia richardsonii*, and *Polygonum douglasii*.

**Succession**—The majority of communities within the POTR/TALL FORB c.t. are believed to be near-climax aspen communities (that is, they represent a POTR/ TALL FORB habitat type) or at least grazing-altered communities of an essentially climax type. Prolonged heavy grazing will probably cause a substantial reduction in species diversity. If abusively grazed by cattle for many years, a reduction in the amount of relatively palatable grasses and forbs can be expected with a shift in species composition to dominance by such relatively unpalatable forbs as *Rudbeckia occidentalis* (fig. 7) and possibly *Lathyrus* spp. Indeed, a *Populus tremuloides / R. occidentalis* c.t. may be in order to describe those conditions where *R. occidentalis* is very abundant and remnant members of the tall forb guild are no longer present. In some cases, *S. serra* may also increase substantially under heavy cattle use. Such use by sheep will tend to reduce the amount of palatable forbs and shift species composition toward dominance by such grasses as *E. glaucus* and *B. carinatus*. Prolonged abusive grazing by either class of livestock could eliminate most of the palatable perennials and favor an increase in annuals. Extreme cases of abusive grazing in this type may result in conversion of what was once a lush mixture of perennial grasses and forbs into an impoverished undergrowth consisting primarily of annuals (fig. 8). Some stands now classified as POTR/TALL FORB c.t. may actually represent a grazing-altered condition of a *Populus tremuloides / Symphoricarpos oreophilus*/Tall Forb, or a *P. tremuloides / Amelanchier alnifolia-Symphoricarpos oreophilus*/Tall Forb type. This change in classification status would be caused by the reduction of shrubs by browsing pressures.

At least a third of the stands within this type contained minor amounts of conifers, either as reproduction in the undergrowth or as an occasional tree in the overstory. In most cases, the conifer was *A. lasiocarpa*. In such cases, given the course of natural succession, these particular stands might be seral communities within an *A. lasiocarpa* forest climax series. An increase of *A. lasiocarpa* can be expected with time as additional reproduction becomes established. As conifers gradually begin to dominate the overstory, composition of the undergrowth vegetation gradually changes and becomes less productive as less light is able to penetrate to the forest floor and as duff accumulates with resulting changes in soil chemistry.

**Production**—The overall potential of this type for the production of wood appears to be slightly better than average, although this varies greatly between individual stands. A total of 64 stands were sampled for production. Tree basal area averaged 155 $ft^2$/acre (35.6 $m^2$/ha). An average 98 percent of this was aspen. Two-thirds of the stands can be expected to have basal areas between 107 and 209 $ft^2$/acre (24.6 and 48.0 $m^2$/ha). Site index at 80 years for aspen averaged 52 ft (15.7 m). Two-thirds of the

Figure 7—Undergrowth dominated by such relatively unpalatable forbs as *Rudbeckia occidentalis* frequently results from many years of excessive cattle grazing in the *Populus tremuloides*/Tall Forb c.t..

Figure 8—Prolonged, abusive livestock grazing can reduce the luxuriant, productive undergrowth of the *Populus tremuloides*/Tall Forb c.t. (fig. 5) to an impoverished condition dominated by such annuals as *Nemophila breviflora, Collomia linearis, Polygonum douglasii*, and *Galium biflorum*, with only trace amounts of the former perennial cover.

stands can be expected to have site indices between 42 and 62 ft (12.8 and 18.9 m). Volume growth of aspen averaged 41 $ft^3$/acre/year (2.9 $m^3$/ha/year), with two-thirds of the stands ranging between 28 and 54 $ft^3$/acre/year (1.96 and 3.78 $m^3$/ha/year). Aspen reproduction was highly variable but averaged in the upper quarter of the stands, or 2,653 suckers/acre (6,555/ha). Over half of these suckers were in the 1- to 4.6-ft (0.3- to 1.4-m) height class. Tree density averaged 972 stems/acre (2,401/ha), which was in the upper third of the stands.

Production of undergrowth is fairly high, ranking in the upper third of all aspen stands sampled. Average production of air-dry material was 1,107 lb/acre (1,240 kg/ha); two-thirds of the stands can be expected to produce between 570 and 1,644 lb/acre (638 and 1,841 kg/ha). The majority of this production consisted of forbs, an average 78 percent, with most of the rest graminoids, an average 17 percent. Only 5 percent of the growth was shrubs. Forage suitability for over two-thirds of this undergrowth was classified as desirable, 53 percent, or intermediate, 26 percent.

Thus, the POTR/TALL FORB c.t. appears in general to be slightly better than average for the production of wood fiber and much better than average for the production of forage. The abundance of forbs in relation to graminoids indicates that the type is better suited as summer range for sheep than for cattle. The value as wildlife habitat is moderately good for foraging but marginal as cover because of the low structural diversity of the vegetation, and especially because of the absence of an effective shrub component in the undergrowth.

**Other**—Communities belonging to the POTR/TALL FORB c.t. were recognized in earlier aspen classifications for the Region, but different epithets were used to name it. Communities within the *Populus tremuloides / Rudbeckia occidentalis, P. tremuloides / Heracleum lanatum,* and *P. tremuloides / Ligusticum filicinum* c.t.'s of classification for the Bridger-Teton National Forest (Youngblood and Mueggler 1981) are now lumped into the POTR/TALL FORB c.t. Communities within the *P. tremuloides / Rudbeckia occidentalis* c.t. in the Caribou and Targhee National Forest classification (Mueggler and Campbell 1982) are now placed in this type. And communities identified as within the *P. tremuloides / Senecio serra* and *P. tremuloides / Heracleum lanatum* c.t.'s in the Utah classification (Mueggler and Campbell 1986) are now combined in this type. The POTR/TALL FORB c.t. supersedes all of the above types described in these earlier classifications.

Not only is the POTR/TALL FORB c.t. common in the Intermountain Region, aspen communities with similar vegetation structure and characterizing species appear to be fairly common in the central Rocky Mountains. About two-thirds of the stands Hoffman and Alexander (1980, 1983) used to characterize the *P. tremuloides / Thalictrum fendleri* habitat type on the Routt and White River National Forests in western Colorado, and about one-third of the stands in this type in the Medicine Bow National Forest in southeastern Wyoming (Alexander and others 1986), contain the tall forb and grass components similar to our POTR/TALL FORB c.t. Their *P. tremuloides / T. fendleri* type appears to be primarily a generalized combination of our POTR/TALL FORB and POTR/CARU types.

## *Populus tremuloides/Symphoricarpos oreophilus*/Tall Forb Community Type (POTR/SYOR/TALL FORB c.t.)

**Distribution**—The POTR/SYOR/TALL FORB c.t. is the second most common type in the Region and accounts for over 10 percent of all stands sampled. As with the POTR/TALL FORB c.t., it is primarily confined to the northern half of the Region and seldom occurs south of 39° latitude. It is the most frequently encountered type on the Uinta National Forest where it accounts for 27 percent of the stands. Over 10 percent of the stands on the Caribou, Wasatch-Cache, Manti-LaSal, and Humboldt National Forests were of this type. It is common on the Bear River, Wasatch, and west end of the Uinta Mountains in northern Utah, and on the Jarbidge and Santa Rosa Mountains of northern Nevada. Although it was found on the Bridger-Teton National Forest in western Wyoming, it was not nearly as abundant there as was the closely related POTR/TALL FORB c.t.

This is typically an intermediate elevation type. Over two-thirds of the stands within the Region were at less than 8,000 ft (2,400 m) elevation. The type clearly demonstrates the effect of latitude upon the elevational distribution of a plant community. In northern Utah on the Wasatch-Cache National Forest, stands occurred at elevations between 6,200 and 8,800 ft (1,890 and 2,680 m). In central Utah on the Manti-LaSal National Forest, an average 2° latitude farther south, the type occurred at elevations generally about 1,000 ft (300 m) higher, between 7,700 and 9,700 ft (2,350 and 2,960 m) elevation. The type was usually on fairly gentle slopes of less than 25 percent steepness, irrespective of aspect. Although it occurred on a wide variety of soils, almost half of the stands were on sandstone parent material.

**Vegetation**—Species composition in this common type is similar to that of the POTR/TALL FORB c.t., except for the presence of a stratum of low shrubs composed primarily of *Symphoricarpos oreophilus,* or in some cases *Pachystima myrsinites, Rosa* spp., or possibly *Symphoricarpos albus*. Species diversity is usually great, with a wide variety of tall forbs, low forbs, graminoids, low shrubs, and annuals (fig. 9). An occasional tall shrub species such as *Amelanchier alnifolia* or *Prunus virginiana* may be present, but not to the extent of forming a separate stratum. The herbaceous stratum generally consists of a luxuriant mixture of forbs and graminoids. The most common tall forb species that characterize the type are *Agastache urticifolia, Senecio serra, Hackelia floribunda,* and *Valeriana occidentalis*. Other tall forbs that may be prominent include *Aster engelmannii, Mertensia arizonica,* and *Osmorhiza occidentalis*. In some cases, *Rudbeckia occidentalis* is common. Common low forbs include *Thalictrum fendleri, Geranium viscosissimum, Osmorhiza chilensis*, and *Stellaria jamesiana*. Occasionally, *Lathyrus* spp. will tend to form a mat covering much of the other undergrowth. The most common grasses in this type are the tall-growing *Bromus carinatus, Agropyron trachycaulum,* and *Elymus glaucus*. The type usually has an abundance of annuals growing on the rather loose, friable soil. The most common of these are *Nemophila breviflora, Descurainia richardsonii, Galium bifolium, Collomia linearis,* and *Polygonum douglasii.*

**Succession**—*Abies lasiocarpa* was present in small amounts in about a fourth of the 205 stands sampled. Given time, these stands might eventually succeed to dominance by this conifer, so they should be considered as

Figure 9—The *Populus tremuloides/Symphoricarpos oreophilus*/Tall Forb c.t., the second most common type in the Intermountain Region, is primarily found in the northern half. This stable aspen type typically consists of a rich mixture of tall and low forbs, graminoids, and low shrubs dominated by *S. oreophilus*.

occupying part of the *A. lasiocarpa* series of habitat types. Other stands had a few other conifers in minor amounts, principally *A. concolor* and *Pseudotsuga menziesii*. However, the majority of stands within the POTR/SYOR/TALL FORB type appeared to represent a condition where aspen is a stable or climax overstory species.

The undergrowth is essentially a shrub and forb complex that has undergone various degrees of alteration because of past grazing by sheep or cattle or both. Abusive livestock grazing usually reduces diversity of the undergrowth appreciably. Extended heavy use by sheep will likely shift species composition from the more palatable tall forbs and *S. oreophilus* to an undergrowth dominated by *E. glaucus, B. carinatus,* and possibly *Poa pratensis*. Excessive cattle grazing may shift composition to dominance by *R. occidentalis, Lathyrus* spp., *Vicia americana,* and possibly *M. arizonica* or *S. serra*. The dense blanket of *V. americana* and *Lathyrus* spp. sometimes found in these stands is probably an artifact of livestock use. Prolonged abusive grazing by livestock can eventually change the undergrowth to a depauperate condition where only unpalatable perennials and annuals remain.

**Production**—The wood-producing capacity of this type appears to be about average for aspen communities within the Region. Total tree basal area for the 41 stands sampled for production in the type averaged 130 $ft^2$/acre (29.8 $m^2$/ha). Two-thirds of the stands can be expected to have basal areas ranging between 79 and 181 $ft^2$/acre (18.1 and 41.6 $m^2$/ha). Site index for aspen at 80 years averaged 47 ft (14.3 m), with two-thirds of the stands expected to be between 35 and 59 ft (10.7 and 18.0 m). Wood volume production at maturity averaged 35 $ft^3$/acre/year (2.4 $m^3$/ha/year). Two-thirds of the stands should produce somewhere between 19 and 51 $ft^3$/acre/year (1.3 and 3.6 $m^3$/ha/year). Sucker regeneration appeared to be more favorable than in most of the types, with an average of 1,224 suckers/acre (3,024/ha). This was about evenly divided between small and large suckers but was highly variable between stands. For example, the production of suckers less than 1 ft (0.3 m) high ranged from none to over 24,000/acre (59,000/ha). Aspen trees averaged 855 stems/acre (2,112/ha), which was in the upper third of the stands. Two-thirds of the stands can be expected to have between 360 and 1,350 stems/acre (400 and 1,510 stems/ha).

Although the quantity of undergrowth varies from stand to stand, the overall average for the type ranks in the upper fourth of all aspen stands sampled. This productive mixture of vegetation classes averaged 1,224 lb/acre (1,372 kg/ha) of air-dry material. Two-thirds of the stands in this type will produce between 694 and 1,754 lb/acre (777 and 1,964 kg/ha). The majority of this herbage (63 percent) consisted of a diverse mixture of forbs, and the remainder was almost evenly divided between shrubs and graminoids. Overall suitability of this vegetation as forage for livestock ranked as 53 percent desirable, which is a little better than and median for all aspen communities. The least desirable forage category averaged a relatively high 15 percent.

In general then, the POTR/SYOR/TALL FORB c.t. appears to rank in the upper third of all stands in its potential to produce wood fiber. It is also regarded as productive livestock range, particularly for sheep. It produces ample amounts of palatable forbs as well as palatable browse species. Wildlife habitat values are better than in the POTR/TALL FORB c.t. because of the presence of a low-shrub stratum that enhances structural diversity, but the values are less than optimum because of the lack of a tall shrub layer and mixed conifers in the tree stratum.

**Other**—In earlier aspen classifications, communities within this type were recognized as separate entities but were given different names. In the Utah classification (Mueggler and Campbell 1986), these communities were identified as the *Populus tremuloides / Symphoricarpos oereophilus / Senecio serra* c.t. In the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982), they were identified as the *P. tremuloides / S. oreophilus— Rudbeckia occidentalis* c.t. Part of the communities within the less specific *P. tremuloides / S. oreophilus* c.t. of the Bridger-Teton National Forest aspen classification (Youngblood and Mueggler 1981) are included in the new POTR/SYOR/TALL FORB c.t.

## *Populus tremuloides/Amelanchier alnifolia—Symphoricarpos oreophilus/* Tall Forb Community Type (POTR/AMAL-SYOR/TALL FORB c.t.)

**Distribution**—This major community type is most prevalent in the northern half of the Region and is particularly abundant on the Wasatch-Cache National Forest where it accounted for 10 percent of the aspen communities. It is also fairly abundant on the Caribou, Uinta, and Humboldt National Forests. Greatest concentrations appear to be along the Bear River and Wasatch Mountain ranges. A single stand was observed as far south as the Abajo Mountains in southeastern Utah.

The POTR/AMAL-SYOR/TALL FORB c.t. occurs at fairly low to moderate elevations. Elevational extremes ranged from a low of 5,500 ft (1,680 m) on the Wasatch-Cache National Forest to a high of 8,800 ft (2,690 m) on the Uinta. Over 80 percent of the stands sampled were encountered at elevations between 6,000 and 8,000 ft (1,800 and 2,440 m) and on slopes between 10 and 40 percent steepness. They occurred on all exposures and slope configurations. Although the type can be found on soils derived from a wide variety of parent materials, almost half occupied soils derived from sandstone.

**Vegetation**—Although the tree overstory consists almost exclusively of a single species, *Populus tremuloides*, the undergrowth is among the most complex of any of the aspen types. Structurally, the undergrowth consists of three layers: tall shrubs, low shrubs, and a complex mixture of herbs (fig. 10). The presence of a tall shrub layer is what distinguishes this type from the POTR/SYOR/TALL FORB c.t. This tall shrub stratum, consisting primarily of *Amelanchier alnifolia* and *Prunus virginiana*, is sometimes well defined and at other times scattered and open. In either event, combined canopy cover of the tall shrub species exceeds 10 percent. The low shrub stratum is generally well defined and consists primarily of *Symphoricarpos oreophilus. Rosa woodsii* is frequently present, and at times *Pachystima myrsinites* is abundant. The herbaceous undergrowth is a complex mixture of tall-growing forbs and grasses with a substantial component of low-growing herbs. The tall forb guild is represented by the prominence of one or more of the following characterizing species: *Agastache urticifolia, Aster engelmannii, Delphinium occidentale, Hackelia floribunda, Mertensia*

Figure 10—The structurally diverse *Populus tremuloides/Amelanchier alnifolia—Symphoricarpos oreophilus*/Tall Forb c.t. is common in the northern half of the Intermountain Region. The undergrowth consists of three principal strata: tall shrubs (usually *A. alnifolia* or *Prunus virginiana*), low shrubs (principally *S. oreophilus, Rosa woodsii,* or *Pachystima myrsinites*), and an herb layer dominated by tall forbs.

*arizonica, Osmorhiza occidentalis, Senecio serra, Valeriana occidentalis,* and *Heracleum lanatum.* Usually, no single species of this group dominates the undergrowth. Instead, the undergrowth contains a melange of several members of this group whose combined cover exceeds 10 percent. Exceptions exist where the herbaceous cover is dominated by only one member of the tall forb guild. Tall grasses are common, particularly *Elymus glaucus* and *Bromus carinatus*; frequently, *Agropyron trachycaulum, Poa pratensis,* and *Carex hoodii* are also conspicuous. Low-growing forbs generally are an important part of the herb stratum; the most commonly encountered and abundant of these are *Thalictrum fendleri, Osmorhiza chilensis,* and *Geranium viscosissimum.* Various species of *Lathyrus* and *Vicia americana* occasionally tend to blanket the low shrubs and herbs. Annual plants, particularly *Nemophila breviflora, Descurainia richardsonii, Galium bifolium,* and *Polygonum douglasii,* are common and sometimes abundant.

**Succession**—The POTR/AMAL-SYOR/TALL FORB c.t. is believed to be primarily a climax community type. Conifers are infrequent and present in only minuscule amounts. Stands within this type will likely remain dominated by a *Populus tremuloides* tree layer. Abusive grazing tends to appreciably decrease the amount of palatable forbs and shrubs. If grazed by sheep, grasses such as *E. glaucus, B. carinatus,* and *P. pratensis* tend to gain dominance. If grazed by cattle, *Rudbeckia occidentalis, Lathyrus* spp., and in some cases *S. serra* tend to increase substantially. Both the tall and low shrub species are likely to decrease under prolonged abusive grazing, particularly by sheep. Under these conditions, tall remnants of *A. alnifolia* and *P. virginiana* may exist over an herbaceous undergrowth dominated by annuals.

**Production**—The potential for wood production in this type appears to be somewhat below the average. Total tree basal area of the 28 stands sampled for production averaged 116 $ft^2$/acre (26.5 $m^2$/ha), aspen site index averaged 46 ft (14.1 m) at 80 years, and volume growth at stand maturity 34 $ft^3$/acre/year (2.4 $m^3$/ha/year). All of these averages were in the lower third of the values for all aspen stands. Two-thirds of the stands can be expected to have total tree basal areas between 88 and 144 $ft^2$/acre (20.2 and 33.1 $m^2$/ha), site indices for aspen between 37 and 55 ft (11.3 and 16.8 m), and volume growth of aspen between 22 and 46 $ft^3$/acre/year (1.5 and 3.2 $m^3$/ha/year). Aspen reproduction, however, was considerably better than in most aspen stands. The average of 2,540 suckers/acre (6,257/ha) was in the upper third of all stands; a third of these were taller than 1 ft (0.3 m). As is usually the case, sucker numbers were highly variable between stands. Tree numbers were about average at 782 stems/acre (1,932/ha). Two-thirds of the stands within this type can be expected to have between 361 and 1,203 stems/acre (892 and 2,973/ha).

The undergrowth in this type is not only highly diverse but also fairly productive. Annual air-dry production averaged 1,180 lb/acre (1,322 kg/ha), which is in the upper third of the stands. Two-thirds of the stands within the type can be expected to produce between 833 and 1,527 lb/acre (933 and 1,702 kg/ha). About half of this production consisted of forbs, an average 48 percent, and the remainder was about equally divided between shrubs (27 percent) and graminoids (25 percent). The undergrowth was in the mid range of forage suitability, with 54 percent desirable and 40 percent of intermediate suitability.

Overall multiple-use values, therefore, appear to be fairly high for the POTR/AMAL-SYOR/TALL FORB c.t. Although the potential for wood fiber production is slightly below average for aspen stands within the Region, both the values related to livestock forage and wildlife habitat are well above average. The relative abundance of forbs and shrubs in the undergrowth suggests that the type is better suited as summer range for sheep than for cattle. The great amount of structural diversity in the undergrowth enhances the general value of this type as wildlife habitat considerably beyond that of either the POTR/TALL FORB or POTR/SYOR/TALL FORB types.

**Other**—Most of the aspen communities formerly classified under the name of the *Populus tremuloides / Prunus virginiana / Senecio serra* c.t. in the Utah aspen classification (Mueggler and Campbell 1986) are now included in the POTR/AMAL-SYOR/TALL FORB c.t. A few of those communities identified in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982) as belonging to the *P. tremuloides / Amelanchier alnifolia—Symphoricarpos oreophilus* c.t. are now in the POTR/AMAL-SYOR/TALL FORB c.t. The new type name is considered a refinement over the more generalized earlier treatments by breaking out differences in vegetation structure and herbaceous components.

Although this particular type has not been reported elsewhere, similar communities likely occur at least in western Colorado. Aspen communities with both a tall shrub component of either *Amelanchier alnifolia* or *Prunus virginiana* and a low shrub component of *Symphoricarpos oreophilus* are included in reports by Hoffman and Alexander (1980, 1983) and by Johnston and Hendzel (1985).

## *Populus tremuloides—Abies lasiocarpa*/Tall Forb Community Type (POTR-ABLA/TALL FORB c.t.)

**Distribution**—This major seral community type is most abundant in western Wyoming where it accounts for 8 percent of the aspen communities on the Bridger-Teton National Forest. It is widely scattered across most of the other Forests within the Region but is relatively infrequent in southern Utah and Nevada.

It is a moderate- to high-elevation type with three-fourths of the sampled stands at elevations above 8,000 ft (2,440 m). Elevational extremes ranged from a low of 6,600 ft (2,000 m) on the Caribou National Forest to a maximum elevation of 10,200 ft (3,100 m) on the Fishlake National Forest. Two-thirds of the 51 stands sampled were on northerly or easterly exposures of moderately steep slopes. Although apparently not restricted by soil parent materials, over half were on soils derived from either sandstones or limestones.

**Vegetation**—The structural diversity of this major type is enhanced by the presence of significant amounts of conifers, primarily *Abies lasiocarpa,* in the tree stratum. Frequently this is in the form of conifer reproduction that is slowly replacing the temporarily dominant *Populus tremuloides* (fig. 11). The type is characterized by at least 10 percent cover of *A. lasiocarpa* or *Picea engelmannii* or a combination, the absence of a well-defined layer of shrubs, and the prominence of one or more members of the tall forb group in the herb stratum. Thus, the structure of the undergrowth is fairly simple. The herb layer, however, is frequently a rather complex mixture of tall and low forbs and graminoids. The most commonly encountered tall forbs in this type are *Rudbeckia occidentalis, Aster engelmannii, Valeriana occidentalis, Delphinium occidentalis,* and *Osmorhiza occidentalis.* Grasses and low forbs also form an important part of the herb layer. The most common grasses are *Bromus carinatus, Elymus glaucus, Agropyron trachycaulum,* and *Poa nervosa.* The most common low herbs are *Osmorhiza chilensis, Thalictrum fendleri, Geranium viscosissimum, Taraxacum officinale,* and *Stellaria jamesiana.* Annuals are fairly common in the type, especially *Nemophila breviflora, Collomia linearis,* and *Descurainia richardsonii.* Shrubs such as *Symphoricarpos oreophilus, Ribes montigenum,* and *Sambucus racemosa* may be present but are never prominent enough to form a distinct stratum.

**Succession**—The POTR-ABLA/TALL FORB c.t. is a seral type in which the *P. tremuloides* overstory will eventually be replaced by *A. lasiocarpa* during succession. Comparisons with habitat types identified for Idaho (Steele and others 1983) and northern Utah (Mauk and Henderson 1984), based on commonality of species with high constancy, suggest that this seral type is most likely a succesional stage within the *A. lasiocarpa / Osmorhiza chilensis* habitat type (appendix E). As conifers increase in the overstory, reduced light on the forest floor, as well as possible changes created by duff buildup, appreciably alters undergrowth production and composition. The decrease in undergrowth production becomes pronounced with as little as 15 percent conifer cover in the overstory (Mueggler 1985b). Tall forbs and grasses tend to decline while such low forbs as *T. fendleri* and *O. chilensis* gain relative prominence. An aspen-dominated community can be maintained on these sites only if the conifers are removed, usually by burning or clearcutting (Schier and others 1985). When this occurs, *P. tremuloides* usually suckers rapidly and profusely from the remnant root system of this clonal species. The conifers, however, must reestablish from seed. The rapidity of aspen replacement by conifers depends to a great extent on the availability of a conifer seed source. Replacement might take place in less than 100 years if abundant conifer seedlings become established from residual seed immediately following the disturbance. In other cases, if conifer establishment depends upon gradual invasion from outside the stand, replacement of aspen may not occur for several hundred years.

Heavy sheep grazing in this type usually leads to replacement of many of the palatable tall forbs with an increased abundance of such tall grasses as *B. carinatus, E. glaucus,* and *A. trachycaulum.* Under heavy cattle use, these grasses and the palatable forbs tend to decrease and species such as *R. occidentalis, T. fendleri, O. chilensis,* and *Lathyrus* spp. become more prominent. If consistently grazed during the latter part of the growing season, *S. serra* and *M. arizonica* may increase substantially. Prolonged abusive grazing could lead to undergrowth

Figure 11—The *Populus tremuloides—Abies lasiocarpa*/Tall Forb c.t. is a seral type in which the aspen overstory is slowly being replaced by *A. lasiocarpa.* As overstory shading increases, productivity of the luxuriant tall forb undergrowth will gradually diminish.

dominated by *T. officinale* and *Poa pratensis* or even eventual replacement of the perennial herbs by such annuals as *N. breviflora, C. linearis,* and *Galium bifolium.*

**Production**—The ability of this type to produce trees appears to be just slightly better than average. Total basal area on the 17 sites sampled for production averaged 169 ft$^2$/acre (38.9 m$^2$/ha), which was just barely within the upper third percentile. An average 28 percent of this basal area consisted of conifers, primarily *A. lasiocarpa*. The remainder was aspen. Two-thirds of the stands can be expected to have between 107 and 231 ft$^2$/acre (24.6 and 53.0 m$^2$/ha) tree basal area. Site index for aspen at 80 years averaged 55 ft (16.1 m), with two-thirds of the stands in the type expected to fall between 45 and 65 ft (13.7 and 19.8 m). Volume growth for aspen also is just slightly better than average at 45 ft$^3$/acre/year (3.2 m$^3$/ha/year) at stand maturity. Two-thirds of the stands can be expected to produce between 32 and 58 ft$^3$/acre/year (2.2 and 4.1 m$^3$/ha/year). Aspen reproduction in these stands averaged 2,688 suckers/acre (6,641/ha), which was in the upper 25 percent of all stands sampled in the Region. The number of aspen trees per acre was about average for all stands at 550 stems/acre (1,359/ha), with two-thirds of the stands expected to have between 264 and 836/acre (654 and 2,066/ha). Conifer reproduction, on the other hand, averaged 609 established seedlings/acre (1,505/ha), 98 percent of which were *A. lasiocarpa*.

Undergrowth productivity appears to be moderate. The average air-dry annual production of undergrowth was 917 lb/acre (1,028 kg/ha), which was about average for all stands. The variability in this production, however, was such that two-thirds of the stands in the type should produce between 388 and 1,446 lb/acre (435 and 1,620 kg/ha). The amount of undergrowth in this seral type diminishes greatly as conifers increase. Harper (1973) observed that undergrowth production in aspen stands was cut in half when conifers increased to approximately 20 ft$^2$/acre (4.6 m$^2$/ha). Therefore, by the time conifer invasion accounts for 10 percent of the tree basal area, undergrowth production is probably being reduced appreciably. Undergrowth production is usually dominated by forbs, which were 77 percent of the total. Shrubs are a minor part of this total, averaging only 5 percent. The remaining 18 percent consists of graminoids. The quality of this undergrowth as livestock forage was in the lower third of all stands sampled, with only 43 percent considered desirable and 30 percent of intermediate suitability.

Overall, then, the POTR-ABLA/TALL FORB c.t. is only moderately productive of wood fiber and only moderately valuable as summer range for livestock, when compared to the aspen forests of the whole Region. The process of succession to conifers would render long-term grazing values transitory. The grazing values are probably greater for sheep than for cattle because of the abundance of forbs and relative scarcity of grasses. The undergrowth is less diverse than most of the other types in which the tall forbs are an important undergrowth component. It thus is of less value as habitat for ground-dwelling wildlife. However, the mixture of aspen and conifers in the tree layer should enhance the type's value as habitat for birds.

**Other**—This seral type was recognized in previous classifications, but the naming of the type differed. The POTR-ABLA/TALL FORB type replaces the name for communities within the *Populus tremuloides—Abies lasiocarpa / Senecio serra* type name used in the Utah aspen classification (Mueggler and Campbell 1986). Communities within both the *P. tremuloides—A. lasiocarpa / Rudbeckia occidentalis* and *P. tremuloides—A. lasiocarpa / Ligusticum filicinum* c.t.'s, and a minor part of those in the *P. tremuloides—A. lasiocarpa / Arnica cordifolia* c.t., identified in the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981), are now within the POTR-ABLA/TALL FORB c.t. The type was not recognized per se in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982).

Aspen types successional to *Abies lasiocarpa* forests are common in other parts of the Rocky Mountain States (Johnston and Hendzel 1985). Although this particular type has not been specifically identified elsewhere, Johnston and Hendzel (1985) describe a community in western Colorado that contains a tall forb component, lacks a shrub layer, and is successional to *A. lasiocarpa*.

## *Populus tremuloides/Calamagrostis rubescens* Community Type (POTR/CARU c.t.)

**Distribution**—This is a relatively common type in the northern half of the Region, particularly in eastern Idaho and western Wyoming. Approximately 18 percent of the aspen stands encountered on the Targhee National Forest, 10 percent on the Caribou, and 12 percent on the Bridger-Teton were of this community type. It is especially common in the Centennial Mountains of Idaho and on the Gros Ventre Range of western Wyoming. The type also occurs, though less frequently, in northern and central Utah on the Ashley, Wasatch-Cache, Uinta, and Manti-LaSal National Forests. Occasional stands were as far south as the LaSal and Abajo Mountains in southeastern Utah. It was not observed in Nevada.

Although this type occurs over a wide range of elevations, approximately three-fourths of the 90 stands sampled grew at elevations below 8,000 ft (2,440 m). This no doubt reflects the distribution in the northern part of the Region where most of the aspen is found below about 8,500 ft (2,600 m) elevation. The type occupies slopes and benches irrespective of aspect or slope configuration. Although found on all types of soils, almost half the stands grew on soils derived from sandstone.

**Vegetation**—The vegetation of this major community type is comparatively simple both in structure and in composition. Most of the time, *Populus tremuloides* is the only tree in the overstory. Conifers, if present, are only incidental. Shrubs such as *Symphoricarpos oreophilus, Rosa woodsii, Amelanchier alnifolia,* and *Juniperus communis* may be present but never in sufficient abundance to form a distinct layer. The undergrowth, therefore, is principally herbaceous species. The type is characterized by the prominence of either *Calamagrostis rubescens* or

*Carex geyeri* in the undergrowth, the absence of a distinct layer of either low or tall shrubs, and the lack of a substantial element of conifers in the tree layer. Most often the undergrowth has an overall aspect of graminoid (fig. 12). Along with *C. rubescens* and *C. geyeri*, common graminoids are *Agropyron trachycaulum, Bromus carinatus, Elymus glaucus,* and *Poa pratensis*. Occasionally *Stipa occidentalis* or *Poa nervosa* will be abundant. Forbs, usually low growing, are always present and are sometimes abundant. The most likely encountered forbs are *Thalictrum fendleri, Geranium viscosissimum, Lupinus argenteus, Osmorhiza chilensis, Fragaria vesca,* and *Achillea lanulosa*. Where grazing has been heavy, *Astragalus miser* and *Taraxacum officinale* may be abundant. Annuals are never abundant.

**Succession**—The POTR/CARU c.t. is believed to represent, basically, a climax plant association but often with considerable alteration of community composition because of grazing. However, the occasional presence of conifer regeneration suggests that in some cases a community in this type might be slowly successional to conifer dominance. The conifer species most likely to replace the aspen in this type are *Pseudotsuga menziesii, Pinus contorta,* or possibly *Abies lasiocarpa*. Thus, some stands within this type might be considered successional to either the *Populus tremuloides—Pseudotsuga menziesii / Calamagrostis* c.t., the *P. tremuloides—Pinus contorta / Carex geyeri* c.t., or possibly the *P. tremuloides—Abies lasiocarpa / Carex geyeri* c.t. Changes in community composition likely because of abusive grazing will be an increase in the abundance of *P. pratensis, T. officinale, A. miser,* and possibly *Lathyrus* spp. as the less grazing-tolerant forage species are reduced.

**Production**—The potential of this type for the production of wood fiber appears to be about average for aspen communities in the Region. Total tree basal area for the 26 stands sampled for production averaged 160 $ft^2$/acre (36.7 $m^2$/ha), with two-thirds of the stands expected to produce between 104 and 216 $ft^2$/acre (23.9 and 49.6 $m^2$/ha). Conifers averaged only 1 percent of this production. Site index at 80 years for aspen averaged 51 ft (15.5 m), with variance such that two-thirds of the stands can be expected to have site indices between 41 and 61 ft (12.5 and 18.6 m). Volume production of aspen at stand maturity averaged 40 $ft^3$/acre/year (2.8 $m^3$/ha/year). Two-thirds of the stands should produce between 27 and 53 $ft^3$/acre/year (1.9 and 3.7 $m^3$/ha/year). Aspen sucker reproduction was fairly good, with numbers averaging 2,107/acre (5,207/ha). These were about equally divided between small and large suckers. The total number of aspen trees was also above average for aspen forests as a whole, with 976 stems/acre (2,411/ha). These numbers were highly variable, however, with as many as 4,279/acre (10,572/ha) observed.

Annual production of undergrowth is also within the middle range of all aspen stands. Total air-dry herbage averaged 973 lb/acre (1,090 kg/ha), with two-thirds of the stands expected to produce somewhere between 579 and 1,367 lb/acre (648 and 1,531 kg/ha). The major part of this undergrowth, 59 percent, consisted of graminoids, with most of the rest forbs, 39 percent. Shrub production was a minimal 2 percent. A high 67 percent of the

Figure 12—The *Populus tremuloides/Calamagrostis rubescens* c.t., common in eastern Idaho and western Wyoming, is characterized by undergrowth that is simple in both structure and composition. It is dominated primarily by graminoids, either *C. rubescens* or *Carex geyeri*. This stand occurs in the Fall River area east of Ashton, ID.

undergrowth production consisted of desirable forage, which was in the upper 10 percent of all stands sampled. A total of 31 percent was classified as intermediately desirable and only 2 percent as least desirable.

The POTR/CARU c.t. thus appears to be moderately productive of both wood fiber and forage. The large proportion of undergrowth consisting of graminoids suggests that the type is better suited as summer range for cattle than for sheep. The paucity of shrubs in the undergrowth and the scarcity of conifers mixed with the aspen overstory result in poor structural diversity. This lack, combined with generally low species diversity, indicate comparatively low value of the type as wildlife habitat.

**Other**—Stands of this composition were identified as POTR/CARU c.t.'s both in the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981) and in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982). The latter classification, however, also contained a category labeled *Populus tremuloides / Calamagrostis rubescens—Poa pratensis,* which is now included in the POTR/CARU c.t. The Utah aspen classification (Mueggler and Campbell 1986) was less definitive than the current classification by including not only *Calamagrostis rubescens* and *Carex geyeri* in the same species guild but *Carex rossii* as well. Additional field experience suggested that *C. rossii* should be treated separately. Therefore, the major part of the aspen stands classified as *P. tremuloides / Carex geyeri* in the Utah classification are now included in the POTR/CARU c.t., and most of the remainder have been placed in a new POTR/CARO c.t. It becomes a bit awkward to use the *C. rubescens* epithet (which includes *C. geyeri*) in the type name in the southern portion of the Region where *C. rubescens* is scarce. But only a few stands of this type occur here so the inconsistency should not be overly discomforting.

Aspen communities with similar composition have been observed in southeastern Wyoming, and in western and central Colorado. Alexander and others (1986) separately identified *Populus tremuloides / Calamagrostis rubescens* and *P. tremuloides / Carex geyeri* habitat types on the Medicine Bow National Forest, both of which would be included in our POTR/CARU c.t. About three-fourths of the stands in Hoffman and Alexander's (1983) *P. tremuloides / C. geyeri* habitat type on the White River National Forest, and all of the stands in Hess and Alexander's (1986) *P. tremuloides / C. geyeri* habitat type on the Arapaho and Roosevelt National Forests, would be included in our POTR/CARU c.t.

## *Populus tremuloides/Symphoricarpos oreophilus/Calamagrostis rubescens* Community Type (POTR/SYOR/CARU c.t.)

**Distribution**—The POTR/SYOR/CARU c.t. is one of the more prominent types in the Region, especially in the northern half. Of the 88 stands sampled in this type, two-thirds were in eastern Idaho and western Wyoming. It is the second most frequent type on the Caribou National Forest. The type is also common in the Uinta Mountains and occurs in the LaSal and Abajo Mountains of southeastern Utah. A single stand of this type was seen in the Independence Mountains of northeastern Nevada. It was not observed on the high plateaus of southern Utah.

Most of the stands were on shallow to moderately steep slopes and were not limited by exposure or slope configuration. However, no stands were found along stream bottoms. Almost two-thirds of the stands grew on soils derived from sedimentary parent materials, primarily sandstones.

**Vegetation**—The undergrowth vegetation of this type is much less complex than that in the POTR/SYOR/TALL FORB c.t. Both types have three strata, but the herbaceous undergrowth in this type is comparatively simple and dominated by graminoids. Most of the stands lack conifers in the tree layer. A low shrub layer is prominent and is usually dominated by *Symphoricarpos oreophilus,* but *Rosa woodsii, Pachystima myrsinites*, or *Symphoricarpos albus* may also be abundant. The tall shrubs *Amelanchier alnifolia* and *Prunus virginiana* are frequently present but are never abundant. The herbaceous undergrowth is similar to that found in the POTR/CARU c.t. The prominence of either *Calamagrostis rubescens* or *Carex geyeri* are indicators of this type (fig. 13). Both these species appear to occupy similar environmental situations in the aspen ecosystem and are therefore considered here as ecological equivalents. Other graminoids frequently abundant are *Elymus glaucus, Agropyron trachycaulum,* and *Poa pratensis*. These graminoids are accompanied by various amounts of low-growing forbs, the most common being *Geranium viscosissimum, Lupinus argenteus, Thalictrum fendleri,* and *Osmorhiza chilensis.* Ordinarily, there are few annuals.

**Succession**—This type appears to be essentially a stable or climax aspen community type. However, about a third of the sampled stands had a few conifers in the overstory or as reproduction, and given sufficient time these may come to dominate the tree strata. Most common were *Pseudotsuga menziesii, Abies lasiocarpa,* and *Pinus contorta.* Conceivably, then, some of the stands in this type could be seral stages within either the *P. menziesii* or *A. lasiocarpa* conifer series. These stands are most likely to be seral to the POTR-PSME/SYOR c.t. or to the POTR-PICO/SYOR c.t. Prolonged overgrazing of the POTR/SYOR/CARU c.t. will probably shift undergrowth composition away from *S. oreophilus* and palatable grasses and forbs and toward *P. pratensis, Taraxacum officinale,* and low-growing, relatively unpalatable forbs.

**Production**—This community type has a moderate potential for the production of wood and a considerably above average potential for the production of forage. The total basal area of trees averaged 155 $ft^2$/acre (35.6 $m^2$/ha) over the 20 stands sampled for production. This figure fell within the mid-third range of all aspen stands sampled in the Region. Basal area production varied appreciably. Two-thirds of the stands can be expected to have basal areas between 101 and 209 $ft^2$/acre (23.2 and 48.0 $m^2$/ha). Virtually all of this was aspen. Site index at 80 years for aspen averaged 53 ft (16.1 m), which again was in the mid-third range of all stands. Two-thirds of all

Figure 13—The *Populus tremuloides/Symphoricarpos oreophilus/Calamagrostis rubescens* c.t. is similar to the POTR/CARU c.t. except it contains a layer of low shrubs usually dominated by *S. oreophilus, Pachystima myrsinites,* or *Rosa woodsii.* This is the second most common aspen type on the Caribou National Forest in eastern Idaho.

stands will probably have site indices between 43 and 63 ft (13.1 and 19.2 m). Volume production at stand maturity averaged a moderate 43 $ft^3$/acre/year (3.0 $m^3$/ha/year). Two-thirds of the stands in the type should produce between 30 and 56 $ft^3$/acre/year (2.1 and 3.9 $m^3$/ha/year). Aspen reproduction averaged in the upper quarter of all stands sampled at 2,055 suckers/acre (5,078/ha). Over half of these exceeded 1 ft (0.3 m) in height. Tree numbers were highly variable between stands. Aspen stems averaged 1,182/acre (2,920/ha), which was in the upper quarter percentile of all stands.

Total annual production of undergrowth averaged 1,309 lb/acre (1,467 kg/ha), which was in the upper quarter of all aspen stands sampled in the Region. Two-thirds of all stands within this type should produce somewhere between 713 and 1,905 lb/acre (799 and 2,134 kg/ha). Graminoids and forbs shared about equally in the composition of undergrowth at 47 and 42 percent, respectively. Shrubs were an average 11 percent. Suitability of the undergrowth as forage ranked fairly high, with 57 percent in the desirable class and 41 percent as intermediate.

The POTR/SYOR/CARU c.t., therefore, is fairly good summer range for livestock, although it is probably better suited for cattle than for sheep because of the abundance of graminoids in the undergrowth. The lack of a tall shrub stratum and the general absence of conifers in the overstory reduce structural diversity and somewhat diminish the value of the type as wildlife habitat.

**Other**—In earlier aspen classifications, stands now included in the POTR/SYOR/CARU c.t. were treated differently. All stands placed in the *Populus tremuloides / Symphoricarpos oreophilus—Calamagrostis rubescens* c.t., the *P. tremuloides / Pachystima myrsinites—C. rubescens* c.t., and in the *P. tremuloides / Spiraea betulifolia—C. rubescens* c.t. under the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982) are now included in the POTR/SYOR/CARU c.t. Part of the stands included in the Utah classification (Mueggler and Campbell 1986) as the *P. tremuloides / S. oreophilus / Carex geyeri* c.t., and a minor part of those in the *P. tremuloides / S. betulifolia* c.t. of the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981), are now classified as POTR/SYOR/CARU c.t. The current arrangement more clearly represents meaningful differences in composition and avoids unwarranted splitting.

Communities similar to this type appear in western Colorado. Approximately two-thirds of the stands that Hoffman and Alexander (1983) placed in the generalized *P. tremuloides / S. oreophilus* habitat type on the White River National Forest are comparable to our POTR/SYOR/CARU c.t.

## *Populus tremuloides/Amelanchier alnifolia—Symphoricarpos oreophilus/ Calamagrostis rubescens* Community Type (POTR/AMAL-SYOR/CARU c.t.)

**Distribution**— Although this major type accounted for only 3 percent of all aspen communities Region-wide, it is important in the northern part. It was the most frequent type on the Targhee National Forest, accounting for 22 percent of the aspen communities, and on the Caribou National Forest where it was 15 percent. A few stands were on the Bear River Range and on the west end of the Uinta Mountains in northern Utah. The type was not encountered farther south in Utah nor was it seen in Nevada.

The POTR/AMAL-SYOR/CARU c.t. is a relatively low elevation type; 85 percent of the stands were at less than 7,000 ft (2,100 m). A fairly high proportion of these stands were on southerly and westerly slopes, some of which exceeded 50 percent steepness. Although they grew on a wide variety of soils, almost half occupied soils derived from sandstone parent materials.

**Vegetation**—The vegetation of this major community type is described on the basis of 68 stands. The tree layer consists almost exclusively of *Populus tremuloides*, except for about a third of the stands where conifers, primarily *Pseudotsuga menziesii,* are present in small amounts. The undergrowth is multistructured. A tall shrub stratum exists that is usually dominated by either *Amelanchier alnifolia* or *Prunus virginiana.* Occasionally *Acer grandidentatum* is abundant. The tall shrub layer frequently is broken and ill defined, but total canopy cover of these species generally exceeds 10 percent. The low shrub stratum is usually dominated by either *Symphoricarpos oreophilus* or *Symphoricarpos albus.* Frequently, *Pachystima myrsinites,* and occasionally *Spiraea betulifolia,* are abundant. *Berberis repens* is often common. The undergrowth is characterized by the presence of these two shrub strata and an herbaceous layer in which *Calamagrostis rubescens* and sometimes *Carex geyeri* are prominent (fig. 14). The only other graminoid that has high constancy is *Elymus glaucus.* Low forbs generally form an important part of the community. The most common and conspicuous of these are *Thalictrum fendleri, Geranium viscosissimum, Lupinus argenteus,* and *Osmorhiza chilensis.* Members of the tall forb complex are absent or incidental in this type. Although a variety of annuals may be present, they are seldom abundant.

**Succession**—The POTR/AMAL-SYOR/CARU c.t. is primarily a stable or climax community type. Those stands containing *P. menziesii* reproduction may eventually succeed to dominance by this conifer, but such succession is likely to be slow. Where this occurs, the stand should be considered a seral stage within the *P. menziesii* climax series, probably through the *Populus tremuloides—Pseudotsuga menziesii/Amelanchier anifolia* c.t. enroute to the *P. menziesii/Osmorhiza chilensis* habitat type (Mauk and Henderson 1984; Steele and others 1983). Abusive livestock grazing in this type will probably lead to a decrease in the abundance of *Symphoricarpos* spp. and other palatable shrubs and a shift in composition away from the more palatable and grazing-sensitive herbs and toward increased amounts of *Poa pratensis, Achillea millefolium, Arnica cordifolia,* and *Taraxacum officinale.*

**Production**—As with the related POTR/SYOR/CARU c.t., this type is only moderately productive of wood but above average in the production of forage. A total of 32 stands were sampled for production. Total tree basal area averaged 117 $ft^2$/acre (26.9 $m^2$/ha), all but 1 percent of which was aspen. This was in the lower third percentile of the aspen stands in the Region. Two-thirds of all stands in this type can be expected to have basal areas

Figure 14—The undergrowth of the *Populus tremuloides/Amelanchier alnifolia—Symphoricarpos oreophilus/Calamagrostis rubescens* c.t. is characterized by the presence of three strata: tall shrubs, low shrubs, and an herbaceous layer in which *C. rubescens* or *Carex geyeri* are prominent graminoids. The type is most commonly encountered on the Targhee and Caribou National Forests in eastern Idaho.

between 84 and 150 $ft^2$/acre (19.3 and 34.4 $m^2$/ha). Site index for aspen at 80 years averaged 49 ft (14.9 m) and at maturity would produce 38 $ft^3$/acre/year (2.6 $m^3$/ha/year). Both these productivity measures ranked in the mid-third of all aspen stands. Two-thirds of all stands in the type could be expected to have site indices between 40 and 58 ft (12.2 and 17.7 m) and volume production between 26 and 50 $ft^3$/acre/year (1.8 and 3.5 $m^3$/ha/year). Aspen reproduction averaged a moderate 1,241 suckers/acre (2,804/ha). Tree stems were also moderately numerous with an average 788 trees/acre (1,947/ha). Two-thirds of the stands are expected to have somewhere between 225 and 1,351 stems/acre (556 and 3,338/ha).

Annual production of air-dry undergrowth averaged 1,107 lb/acre (1,241 kg/ha), which was in the upper third percentile of all stands. Two-thirds of the stands can be expected to produce somewhere between 502 and 1,712 lb/acre (562 and 1,917 kg/ha). Composition averaged 39 percent graminoids, 33 percent forbs, and 28 percent shrubs. A high proportion of the undergrowth, 59 percent, was classified as desirable forage, and 39 percent was noted as intermediate. The generally high production of undergrowth combined with relatively high palatability translates into productive livestock range.

As with the other community types in which *C. rubescens* is the typal herbaceous indicator, the POTR/AMAL-SYOR/CARU c.t. is moderately productive of wood fiber and above average in total undergrowth production but is less productive of herbaceous undergrowth than either the POTR/SYOR/CARU or POTR/CARU types. Annual production of shrubs is more than twice as great in the POTR/AMAL-SYOR/CARU c.t. than either of the others. Thus, the ample production of graminoids, forbs, and shrubs, as well as the good structural diversity created by the abundance of both tall and low shrubs beneath the aspen canopy, makes this type not only better than average summer range for livestock but considerably above average habitat for wildlife as well.

**Other**—Stands now contained within this type were included under various names in earlier preliminary classifications. Most of the stands placed in the *Populus tremuloides / Prunus virginiana / Carex geyeri* c.t. of the Utah classification (Mueggler and Campbell 1986) and in the *P. tremuloides / P. virginiana* and *P. tremuloides / Spiraea betulifolia* c.t.'s in the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981) are now in the POTR/AMAL-SYOR/CARU c.t. All stands formerly within the *P. tremuloides / Amelanchier alnifolia—Pachystima myrsinites* and *P. tremuloides / A. alnifolia— S. betulifolia* c.t.'s, and most of those in the *P. tremuloides / A. alnifolia— S. oreophilus* c.t., of the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982), are now placed in this community type. This new arrangement, based upon a larger sample and improved insight, is more realistic than the previous placements.

Stands similar to these, with both a tall shrub and low shrub layer underlain by either *C. geyeri* or *C. rubescens*, have been observed in western Colorado. A small number of the stands included in the *P. tremuloides / S. oreophilus* habitat type reported for the White River National Forest by Hoffman and Alexander (1983) fit this description.

## *Populus tremuloides/Thalictrum fendleri* Community Type (POTR/THFE c.t.)

**Distribution**—The POTR/THFE c.t. comprised almost 5 percent of the aspen stands within the study area. It occurred on all Forests except the Toiyabe but was most frequent on the northern Forests. It was the most common type on the Bridger-Teton National Forest where it comprised approximately 12 percent of the aspen stands. The type made up 18 percent of the stands on the Targhee, 10 percent of those on the Caribou, and 7 percent of those on the Ashley (appendix C). It occurred on the Santa Rosa, Independence, Jarbidge, East Humboldt, Ruby, and Schell Creek Ranges where it comprised 8 percent of all aspen communities on the Humboldt National Forest.

The type occurred over a wide range of elevations, from 5,700 ft (1,740 m) on the Targhee National Forest to 10,500 ft (3,200 m) on the Manti-LaSal. Over half the stands sampled, however, were within the 7,000 to 9,000 ft (2,100 to 2,700 m) elevational zone. Over two-thirds of the stands grew on straight to concave slopes at mid and lower slope positions. Neither direction of slope nor soil parent material appeared restrictive.

**Vegetation**—The vegetation of this type is essentially two-layered: a tree stratum usually of only *Populus tremuloides*, and a low-herb stratum (fig. 15). An occasional conifer, usually *Abies lasiocarpa* but sometimes *Pseudotsuga menziesii* or *Pinus contorta*, may be present in the tree stratum but is never abundant. Although a well-defined shrub layer is lacking, small amounts of shrubs may be present, particularly *Symphoricarpos oreophilus, Rosa woodsii,* and *Berberis repens*. The type is characterized by the absence of substantial amounts of conifers in the tree layer, the absence of a distinct shrub layer, the absence of appreciable quantities of either *Calamagrostis rubescens* or *Carex geyeri*, and the prominence of either *Thalictrum fendleri, Geranium viscosissimum,* or *Osmorhiza chilensis* in the undergrowth. Other forbs frequently present in substantial amounts include *Lupinus argenteus, Fragaria vesca,* and *Achillea millefolium*. Grasses that are common and often abundant are *Bromus carinatus, Elymus glaucus,* and *Agropyron trachycaulum*. A wide variety of annuals may be present, but they are seldom abundant except for some of the stands in northern Nevada.

**Succession**—Most of the stands within this community type are believed to represent stable aspen situations. However, the successional status of the vegetation with respect to grazing alteration is uncertain. Abusive grazing has led first to an increase in the abundance of such grasses as *Poa pratensis* and perhaps *Stipa occidentalis*, and such forbs as *Taraxacum officinale, A. millefolium, Astragalus miser*, and perhaps *F. vesca* and *Arnica cordifolia* at the expense of the less grazing-resistant forbs. Extreme and continued abusive grazing will likely result in an appreciable increase in such annuals as *Nemophila breviflora, Galium bifolium,* and *Collomia linearis* and a reduction in the perennial grasses and forbs. This situation appears to have occurred in some of the

Figure 15—Although widespread, the structurally simple *Populus tremuloides/Thalictrum fendleri* c.t. is the most common on the Bridger-Teton National Forest in western Wyoming. The undergrowth principally comprises low-growing forbs, of which *T. fendleri, Geranium viscosissimum,* or *Osmorhiza chilensis* are usually prominent.

communities in Nevada. In about a third of the stands in this community type, *Abies lasiocarpa* was present either as an incidental member of the tree layer or as tree reproduction. Conceivably, these stands could be slowly successional to conifer dominance in the *A. lasiocarpa* forest series. Most likely they would succeed to the *Populus tremuloides—Abies lasiocarpa / Thalictrum fendleri* c.t., which appears to be successionally related to the *A. lasiocarpa / Osmorhiza chilensis* habitat type (appendix E).

**Production**—The type appears to be fairly well suited for the growing of trees, with an average of 169 ft$^2$/acre (38.7 m$^2$/ha) of basal area on the 24 stands sampled for production. This ranked in the upper third of all stands sampled in the Region. An average 11 percent of this basal area consisted of conifers. The variance in basal area was such that two-thirds of the stands should have between 112 and 226 ft$^2$/acre (25.7 and 51.9 m$^2$/ha). Site index for aspen and anticipated volume production were a moderate 47 ft (14.4 m) and 36 ft$^3$/acre/year (2.5 m$^3$/ha/year), respectively. Two-thirds of the aspen stands should have a site index between 36 and 58 ft (11.0 and 17.7 m) and volume production at stand maturity between 21 and 51 ft$^3$/acre/year (1.5 and 3.6 m$^3$/ha/year). Aspen sucker reproduction averaged in the upper third percentile of all stands at 1,715/acre (4,238/ha). Over half of these were in the larger size class. The average number of tree stems was in the upper quarter percentile of all stands at 1,084/acre (2,678/ha).

The annual production of undergrowth, 696 lb/acre (781 kg/ha), was slightly less than average for all stands in the Region. Two-thirds of the stands can be expected to produce between 260 and 1,132 lb/acre (291 and 1,268 kg/ha). The bulk of this undergrowth consisted of forbs, an average of 59 percent, with 32 percent of the production in graminoids and 9 percent in shrubs. Suitability of the undergrowth as forage was about average for all aspen stands, with 49 percent classified as desirable, 38 percent as intermediate, and a rather high 13 percent as least desirable.

The overall lack of diversity in vegetation structure, with the absence of shrub strata, tends to reduce the value of the POTR/THFE c.t. as wildlife habitat. The type is of moderate value as summer range for livestock, particularly for sheep, and of moderate value for the production of wood fiber.

**Other**—During the course of this study, I vacillated over recognition of the uniqueness of communities now placed in the POTR/THFE c.t. and over selection of an appropriate epithet. Initially, in the Bridger-Teton National Forests classification (Youngblood and Mueggler 1981), a restricted type of this composition and name was identified. Later, in the Caribou and Targhee National Forest classification (Mueggler and Campbell 1982), the type was recognized, but the *Geranium viscosissimum* epithet was used in the type name. In the Utah classification (Mueggler and Campbell 1986), they were not identified as a separate community type but were included where they best fit in other types. The current type is broader than that in both the Caribou/Targhee classification and in the Bridger-Teton classification in that it

Figure 16—The *Populus tremuloides/Symphoricarpos oreophilus/Thalictrum fendleri* c.t. is widespread throughout the Intermountain Region; it is most common in the mountain ranges of southern Idaho and northern Utah. The undergrowth comprises a layer of low shrubs (primarily *S. oreophilus*, and a low herb layer in which *T. fendleri, Geranium viscosissimum*, or *Osmorhiza chilensis* are prominent.

includes a major portion of the stands in the *Populus tremuloides/Poa pratensis* type of the former, and portions of the *P. tremuloides/Berberis repens, P. tremuloides/Arnica cordifolia*, and *P. tremuloides/Astragalus miser* types of the latter. The current POTR/THFE c.t fills a needed slot in the classification.

Communities similar to this type were observed on the Medicine Bow National Forest in southeastern Wyoming by Alexander and others (1986). Approximately two-thirds of the stands they placed in their *P. tremuloides/T. fendleri* habitat type are of this structure and approximate composition.

## *Populus tremuloides/Symphoricarpos oreophilus/Thalictrum fendleri* Community Type (POTR/SYOR/THFE c.t.)

**Distribution**—This major community type is widespread throughout the Region and was observed on all National Forests within the study area except the Dixie and Toiyabe. It is most prevalent on the Webster, Bear River, and Wasatch mountain ranges of southern Idaho and northern Utah. It is also a fairly common type in the Santa Rosa, Ruby, and Schell Creek ranges of Nevada. A number of examples of this type appeared as far south as the Abajo Mountains of southeastern Utah.

Elevation extremes of the type range from 5,200 ft (1,600 m) on the Targhee Forest to 8,900 ft (2,700 m) on the Humboldt. Generally, however, it is a low to moderate elevation type with 80 percent of the stands growing between 6,000 and 8,700 ft (1,800 and 2,650 m). Stands generally grew on gentle slopes of less than 25 percent steepness, rather than on benches or flats. They were found on all aspects and on soils derived from both igneous and sedimentary parent materials.

**Vegetation**—The vegetation structure and undergrowth appearance of this type bear considerable resemblance to that of the POTR/SYOR/CARU c.t. Both types have a low shrub stratum dominated primarily by *Symphoricarpos oreophilus*, plus an abundance of low herbs (fig. 16). The primary difference is the lack of the principal indicator graminoids *Calamagrostis rubescens* or *Carex geyeri*, reduced prominence of the forb *Lupinus argenteus*, and a greater abundance of *Bromus carinatus, Stellaria jamesiana*, and annuals. The primary forbs in the POTR/SYOR/THFE c.t. are usually *Thalictrum fendleri, Geranium viscosissimum, Osmorhiza chilensis, Achillea millefolium*, and *Taraxacum officinale*. Low shrubs in addition to *S. oreophilus* include *Rosa woodsii, Berberis repens*, and *Pachystima myrsinites*. Tall shrubs such as *Amelanchier alnifolia* and *Prunus virginiana* may be present but are never abundant enough to form a distinct stratum. The most common annuals are *Nemophila breviflora* and *Galium bifolium*. Conifers, principally *Abies lasiocarpa* or *Pseudotsuga menziesii*, sometimes occur in this type but form only a very minor part of the tree layer.

**Succession**—Most of the stands have *Populus tremuloides* as the dominant and apparently climax tree species. Only a few stands have conifers in sufficient amounts to suggest that they may eventually succeed to conifer dominance. In such cases, these stands are successional communities within the *A. lasiocarpa* or *P. menziesii* series of coniferous forest habitat types. Communities in this type probably have been affected considerably by prolonged livestock use. Abusive grazing over many years will likely reduce the amount of such shrubs as *S. oreophilus* and the more palatable grasses and forbs and increase such species as *Poa pratensis, T. officinale, S. jamesiana,* and annuals. Occasionally, *Lathyrus* spp. and *Vicia americana* may be fairly abundant.

**Production**—Total stand basal area in this type averaged 127 ft²/acre (29.2 m²/ha), which is somewhat less than in the closely related POTR/THFE c.t. and is in the low mid-third percentile of all aspen stands sampled. Two-thirds of the stands should have basal areas somewhere between 93 and 161 ft²/acre (21.4 and 37.0 m²/ha). An average 94 percent of this basal area is aspen trees. Both site index for aspen and volume production at maturity were about average for all aspen stands. Site index at 80 years averaged 48 ft (14.6 m), with two-thirds of the stands between 38 and 58 ft (11.6 and 17.7 m). Volume production averaged 36 ft³/acre/year (2.5 m³/ha/year); two-thirds of the stands should produce between 23 and 49 ft³/acre/year (1.6 and 3.4 m³/ha/year). Aspen reproduction was highly variable but averaged a moderate 1,234 suckers/acre (2,871/ha). The average number of trees, 1,162/acre (2,871/ha), ranked in the upper quarter of all aspen stands in the Region but varied tenfold between stands.

The type is moderately productive of undergrowth, averaging 881 lb/acre of air-dry material annually. This fell within the mid-third percentile of all aspen stands within the Region. Two-thirds of the stands should produce somewhere between 528 and 1,234 lb/acre (591 and 1,382 kg/ha). Most of this production consisted of forbs (42 percent) and graminoids (41 percent). The remaining 17 percent consisted of the annual growth of shrubs. This undergrowth is of better than average suitability as forage; 45 percent was classified as desirable, 51 percent intermediate, and the remaining 4 percent as least desirable.

The POTR/SYOR/THFE c.t. thus appears to be no more than moderately productive of wood fiber and of moderate value as summer range for livestock. The composition of the undergrowth suggests that the forage is of about equal value for sheep as it is for cattle. The presence of a shrub stratum enhances the value of this type over that of the POTR/THFE c.t. as habitat for wildlife.

**Other**—As with the POTR/THFE c.t., separate recognition of a POTR/SYOR/THFE c.t. was fraught with uncertainty in the earlier classifications. All of the stands formerly identified in the *Populus tremuloides / Symphoricarpos oreophilus—Poa pratensis* and *P. tremuloides/ Pachystima myrsinites—Geranium viscosissimum* c.t.'s in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982) are now included in the POTR/SYOR/THFE c.t. Part of the stands contained in the *P. tremuloides / S. oreophilus, P. tremuloides/Arnica cordifolia,* and *P. tremuloides/Astragalus miser* c.t.'s in the Bridger-Teton classification (Youngblood and Mueggler 1981) are now in this type. And a minor portion of those stands in the *P. tremuloides / S. oreophilus / Carex geyeri* c.t. of the Utah classification (Mueggler and Campbell 1986) has been included in POTR/SYOR/THFE c.t. The current arrangement more satisfactorily reflects the differences apparent in the field.

Stands with this structure and approximate composition were observed in northwestern Colorado by Hoffman and Alexander (1980). Approximately half the stands they placed in their *P. tremuloides/S. oreophilus* habitat type are similar to those in our POTR/SYOR/THFE c.t.

## *Populus tremuloides /Amelanchier alnifolia—Symphoricarpos oreophilus/ Thalictrum fendleri* Community Type (POTR/AMAL-SYOR/THFE c.t.)

**Distribution**—The POTR/AMAL-SYOR/THFE c.t. is largely concentrated in the northern half of the Region north of 39° latitude. It is most abundant on the Targhee and Caribou National Forests where it accounted for at least 5 percent of the aspen communities. It occurs on all National Forests within the study area except the Manti-LaSal, Dixie, and Toiyabe.

This is a low to moderate elevation community type. Elevations of sampled stands range from 5,800 ft (1,770 m) on the Targhee National Forest in eastern Idaho to 8,100 ft (2,470 m) on the Humboldt in northeastern Nevada. These stands characteristically grew on gentle slopes (less than 25 percent steepness) in a low or mid-slope position. Although encountered on a wide variety of soil parent materials, almost half the stands grew on soils derived from sandstone.

**Vegetation**—The tree layer of this type consists primarily of *Populus tremuloides. Abies lasiocarpa* or *Pseudotsuga menziesii* are occasionally present but only in small amounts. The undergrowth has a multilayered structure of tall shrubs, low shrubs, and a fairly low-growing layer of herbaceous species (fig. 17). The type is characterized by its lack of conifers in the tree stratum, the presence of both tall and low shrub components, and the lack of significant quantities of both tall forbs and the graminoids *Calamagrostis rubescens* and *Carex geyeri*. As in other types containing an element of tall shrubs, the most common tall shrubs here are *Amelanchier alnifolia* and *Prunus virginiana*. This stratum is frequently open and scattered but overall covers at least 10 percent of the ground surface. Principal species in the low shrub stratum are *Symphoricarpos oreophilus* and *Rosa woodsii*. In a few stands, *S. albus* replaces *S. oreophilus* as the dominant shrub. Other stands have considerable amounts of *Pachystima myrsinites*. The herbaceous undergrowth is dominated primarily by such low-growing species as *Thalictrum fendleri, Geranium viscosissimum, Osmorhiza chilensis,* and *Lupinus argenteus*. Occasional tall forbs, particularly *Agastache urticifolia, Senecio serra* or *Aster engelmannii*, may be present, but they never form a prominent part of the undergrowth. The most commonly encountered and abundant grasses in this type are *Elymus glaucus, Bromus carinatus, Poa pratensis*, and

Figure 17—The undergrowth of the *Populus tremuloides/Amelanchier alnifolia—Symphoricarpos oreophilus/Thalictrum fendleri* c.t. is structurally diverse, consisting of tall shrubs,, low shrubs, and an herbaceous stratum in which such low-growing forbs as *T. fendleri, Geranium vicosissimum, Osmorhiza chilensis*, and *Lupinus argenteus* are usually prominent. This primary community type is most abundant in the northern half of the Region.

*Agropyron trachycaulum*. A variety of annual species may be present but are seldom abundant.

**Succession**—In most of the stands within this type the aspen overstory appears to be stable. However, in stands where conifers are present, the aspen overstory may eventually give way to either *P. menziesii* or *A. lasiocarpa*. These communities might be considered seral stages within these conifer forest series. In the case of the former, the community could succeed to a *Populus tremuloides—Pseudotsuga menziesii /Amelanchier alnifolia* c.t., which is most likely a seral stage within the *P. menziesii/O. chilensis* habitat type (appendix E). If *A. lasiocarpa* is the invading conifer, the community likely will succeed to a *Populus tremoloides—Abies lasiocarpa / Amelanchier alnifolia* c.t., which probably is a seral stage within the *A. lasiocarpa/Berberis repens* habitat type of northern Utah. The successional status of the undergrowth is difficult to assess. The lack of appreciable amounts of tall forbs may be attributable to either abiotic environment or to grazing influences. If grazing is the cause, then the community type may represent a seral stage leading to a POTR/AMAL-SYOR/TALL FORB climax community type. If not, then the type may reflect response of the vegetation to abiotic environment and represent an aspen habitat type.

**Production**—Tree production appears to be moderate. Total stand basal area averaged 134 ft$^2$/acre (30.9 m$^2$/ha), with two-thirds of the stands in the type expected to fall between 98 and 170 ft$^2$/acre (22.5 and 31.0 m$^2$/ha). Aspen made up 98 percent of the basal area. Aspen site index at 80 years averaged a fairly low 43 ft (13.0 m), with a variance placing two-thirds of the stands between 35 and 51 ft (10.7 and 15.5 m). Aspen volume production was equally low. An average 30 ft$^3$/acre/year (2.1 m$^3$/ha/year) can be expected at stand maturity, with two-thirds of the stands within the type producing between 19 and 41 ft$^3$/acre/year (1.3 and 2.9 m$^3$/ha/year). These averages for both site index and volume production were in the lower third percentile for all aspen stands. Despite low tree productivity, aspen regeneration averaged a relatively high 2,681 suckers/acre (6,624/ha). About three-fourths of these suckers were over 1 ft (0.3 m) high. Tree density was also high, averaging 1,072 stems/acre (2,649/ha), which was in the upper 25 percent of all aspen stands.

Annual production of undergrowth was in the upper third of all aspen stands, averaging 1,099 lb/acre (1,232 kg/ha) of air-dry material. Two-thirds of the stands within this type can be expected to produce somewhere between 603 and 1,595 lb/acre (675 and 1,786 kg/ha). This production was fairly well balanced between graminoids at 37 percent, forbs at 35 percent, and shrubs at 28 percent. Overall forage suitability ranked above average, with 50 percent of the cover classified as desirable and 47 percent as intermediate.

The POTR/AMAL-SYOR/THFE c.t thus appears only moderately productive of wood fiber but above average in the production of livestock forage. The type is well above average as wildlife habitat because of good structural diversity of the vegetation cover. The type is considerably better than either the POTR/THFE or POTR/SYOR/THFE types in this respect because of greater undergrowth production and because this undergrowth consists of a diverse mixture of tall shrubs, low shrubs, and a favorable mixture of forbs and graminoids.

**Other**—Vegetation similar to this type occurs in northwestern Colorado. Half the stands included in Hoffman and Alexander's (1980) *Populus tremuloides / Symphoricarpos oreophilus* habitat type on the Routt National Forest resemble stands contained in our POTR/AMAL-SYOR/THFE c.t.

## *Populus tremuloides/Carex rossii* Community Type (POTR/CARO c.t.)

**Distribution**—This major community type is almost exclusively restricted to the southern portion of the Region below 39° latitude. It is by far the most common type on the Toquima and Monitor Ranges of the Toiyabe National Forest where it comprised 54 percent of all stands. It is also abundant on Utah's southern plateaus and is the second most frequently encountered aspen type on the Dixie National Forest (the first is the *Populus tremuloides—Abies lasiocarpa / Carex rossii* c.t.), where it comprises 10 percent of the stands. It makes up 8 percent of the stands on the Fishlake National Forest, where it is especially common on the Sevier and Fishlake Plateaus.

All of the 57 stands sampled to describe this type occurred at elevations over 8,000 ft (2,400 m). The highest elevation was 10,500 ft (3,200 m) on the Sevier Plateau. These high elevations no doubt reflect the relationship between latitude and elevation in the occurrence of aspen forests in the Region. Over 90 percent of aspen communities in southern Utah and Nevada grow at elevations in excess of 8,000 ft (2,400 m) (table 1). The type does best on fairly gentle slopes (less than 25 percent) with straight or concave configuration. Over two-thirds of the stands occurred on such slopes. A total of 80 percent of the stands were on soils of volcanic origin, and another 10 percent were on granitic soils. Thus, the distribution of the type appears to be fairly restricted to soils of igneous parent materials.

**Vegetation**—This is one of the simplest aspen community types in the Region from the standpoint of both vegetation structure and composition (fig. 18). It is similar to the POTR-ABLA/CARO c.t. except for the amount of *Abies lasiocarpa* sharing the tree stratum with *Populus tremuloides*. Occasionally, *Picea engelmannii* and *Pinus flexilis* are also present but never abundant. Communities within the type are essentially two-layered—trees and graminoids. There are few shrubs or forbs. Although shrubs were present in well over half the 57 stands sampled in this type, they were not prominent enough to form a separate stratum. The most common shrubs are *Symphoricarpos oreophilus*, *Artemisia tridentata*, and *Juniperus communis*. Either *Carex rossii* or *Bromus anomalus*, generally the former, are prominent. Other graminoids commonly encountered are *Stipa occidentalis*, *Poa fendleriana*, and *Agropyron trachycaulum*, but many other species can be observed (appendix F). Forbs are generally scarce and limited to low-growing species. The most common are *Lupinus sericeus*, *Stellaria jamesiana*, and *Taraxacum officinale*. Annual plants are scarce.

**Succession**—Many of the stands lack evidence of invasion by conifers, and thus they might be considered essentially stable aspen communities. Other stands, however, appear obviously susceptible to such invasion, from *A. lasiocarpa* in particular, and are thus judged to be seral communities. The direction of succession for these latter communities would be from the POTR/CARO c.t. to the

Figure 18—The *Populus tremuloides/Carex rossii* c.t. is common in the southern half of the Region in both Utah and Nevada. The undergrowth, which is both structurally and compositionally simple, generally consists of a sparse assemblage of species in which either *C. rossii* or *Bromus anomalus* is prominent.

POTR-ABLA/CARO c.t. and eventually to climax plant communities in the *A. lasiocarpa* forest series. The most probable habitat type is the *A. lasiocarpa / C. rossii* as described by Youngblood and Mauk (1985). Excessive grazing no doubt has altered undergrowth composition and contributed to the lack of species diversity. Conceivably, grazing pressures may have reduced the amount of *S. oreophilus* to where it no longer is a prominent shrub. Where this occurs, the community may have once been a *Populus tremuloides / Symphoricarpos oreophilus / Carex rossii* c.t.

**Production**—Overall tree basal area in this type was in the upper quarter of all aspen stands, averaging 191 $ft^2$/acre (43.8 $m^2$/ha). Two-thirds of the stands should have basal areas ranging between 144 and 237 $ft^2$/acre (33.1 and 54.6 $m^2$/ha). An average of only 3 percent of this basal area in the 11 stands sampled consisted of conifers. Production for aspen, however, was only moderate, ranking in the middle third percentile of all aspen stands. Site index at 80 years averaged 50 ft (15.2 m), with two-thirds of the stands expected to have site indices between 42 and 58 ft (12.8 and 17.7 m). Volume production of aspen at stand maturity averaged between 39 and 2.7 $ft^3$/acre/year (2.0 and 3.5 $m^3$/ha/year). Aspen reproduction was highly variable, as is usually the case, but averaged a moderate 1,224 suckers/acre (3,023/ha). Density of trees was also highly variable but averaged in the upper third of all stands at 888 stems/acre (2,194/ha).

This is one of the least productive of the aspen community types for undergrowth. Annual production of air-dry herbage averaged only 257 lb/acre (289 kg/ha), which ranked in the lowest 10 percent of all stands. Two-thirds of the stands within the type should produce between only 77 and 437 lb/acre (86 and 489 kg/ha). This meager undergrowth production is dominated by graminoids at 63 percent, with lesser quantities of forbs at 34 percent, and few shrubs, at 3 percent. Although low in overall productivity, this mix of graminoids and forbs ranks high in suitability as livestock forage. The undergrowth was classified as 70 percent desirable and 28 percent intermediate.

The POTR/CARO c.t. is at least moderately productive of wood fiber but is rather marginal as summer range for livestock and as wildlife habitat. The quality of the forage is good, but the productivity is low, especially for sheep. The lack of diversity in vegetation structure does not meet cover requirement conducive to good habitat for many species of wildlife.

**Other**—These communities were not previously identified as a separate type. Similar communities were not encountered on either the Bridger-Teton National Forest or on the Caribou and Targhee National Forests. In the Utah classification (Mueggler and Campbell 1986), communities of this composition and structure were combined with those in which *Carex geyeri* was the herbaceous epithet. The need for a separate type in which *Carex rossii* is a key indicator species became apparent only after sampling the aspen communities in Nevada.

## *Populus tremuloides—Abies lasiocarpa/ Carex rossii* Community Type (POTR-ABLA/CARO c.t.)

**Distribution**—Although the POTR-ABLA/CARO c.t. makes up only slightly more than 2 percent of the aspen communities within the Region, it is the most frequently encountered aspen type on the high plateaus of southern Utah. It accounts for 20 percent of the aspen stands on the Dixie National Forest and 12 percent of those on the Fishlake (appendix C). It was not observed in Wyoming, Idaho, or northern Utah, and only infrequently in Nevada on the Humboldt and Toiyabe National Forests.

This high-elevation type ranges from 8,000 ft (2,400 m) to 10,300 ft (3,100 m). More than four-fifths of the stands sampled occurred at elevations in excess of 9,000 ft (2,700 m). Communities of this type grew primarily on relatively gentle slopes of all exposures and configurations. However, over 90 percent of the stands occurred on soils derived from igneous parent materials, primarily volcanics.

**Vegetation**—This major seral community type is characterized by the abundance of *Abies lasiocarpa* or *Picea engelmannii* in the tree layer, along with *Populus tremuloides* and a rather sparse, simple undergrowth that lacks a well-defined shrub stratum (fig. 19). There is a prominence of the graminoids *Carex rossii* or *Bromus anomalus* or both, and sometimes the low-growing forb *Trifolium* spp. Forbs are generally sparse, with the occasional exception of an abundance of *Trifolium* spp. or *Astragalus miser.* Other common forbs are *Achillea millefolium, Lupinus argenteus, Fragaria vesca,* and *Taraxacum officinale.* Minor quantities of such shrubs as *Symphoricarpos oreophilus*, *Juniperus communis*, or *Berberis repens* may be present but are seldom prominent. Annual plants are typically scarce. The undergrowth is similar to that of the POTR/CARO c.t. except for the prominence of conifers in the tree stratum.

**Succession**—This is an important seral community type within the *A. lasiocarpa* climax forest series. Given sufficient time the aspen will gradually be replaced by *A. lasiocarpa* and *P. engelmannii*, and undergrowth production will become even more sparse. The type probably represents a major seral community within the *A. lasiocarpa / C. rossii* habitat type of southern Utah (Youngblood and Mauk 1985). Heavy grazing will cause even greater species impoverishment. Grazing tends to favor the dominance of such grazing-resistant species as *T. officinale, A. miser, Trifolium* spp., *A. millefolium,* and perhaps *F. vesca*.

**Production**—Total tree basal area is fairly good, but aspen productivity is below average for aspen stands within the Region. Stand basal area averaged 190 $ft^2$/acre (43.7 $m^2$/ha), which is in the upper quartile of all stands. Two-thirds of the stands within the type can be expected to have between 133 and 247 $ft^2$/acre (30.5 and 56.7 $m^2$/ha). A total of 76 percent of this was aspen and the rest was

Figure 19—The *Populus tremuloides—Abies lasiocarpa/Carex rossii* c.t. is a major successional type most frequently encountered on the plateaus of southern Utah. The undergrowth is similar to that in the *P. tremuloides/C. rossii* c.t., but dominance of aspen in the tree layer is gradually changing to conifers.

conifers. Site index and volume production for aspen ranked in the lower third percentile for all aspen stands. Aspen site index at 80 years for the 16 stands sampled for production averaged 44 ft (13.3 m). Two-thirds of the stands should be between 37 and 51 ft (11.3 and 15.5 m). Aspen volume production at stand maturity averaged 31 $ft^3$/acre/year (2.1 $m^3$/ha/year), with between-stand variability such that two-thirds of the stands within the type should produce between 22 and 40 $ft^3$/acre/year (1.5 and 2.8 $m^3$/ha/year). Aspen reproduction averaged a moderate 2,156 suckers/acre (5,328/ha), with tree density averaging a moderate 737 stems/acre (1,806/ha). Established conifer seedlings averaged 1,771/acre (4,376/ha), 87 percent of which were *A. lasiocarpa*.

This type produces less undergrowth on the average than any of the other aspen community types. Annual air-dry herbage averaged only 190 lb/acre (213 kg/ha); two-thirds of the stands should produce somewhere between 25 and 355 lb/acre (28 and 398 kg/ha). In contrast to the closely associated POTR/CARO c.t., the bulk of this undergrowth is forbs, 60 percent, rather than graminoids, 36 percent. This suggests that the graminoids tend to decrease in abundance as intensity of shading increases because of increased amounts of conifers in the tree layer. Shrubs averaged only 4 percent of the undergrowth. The overall suitability of this undergrowth as livestock forage was only moderate, with 49 percent desirable and 47 percent intermediate.

Although total stand basal area is fairly high, the POTR-ABLA/CARO c.t. is somewhat below average for the production of wood fiber. It is poor summer range for livestock because of meager undergrowth productivity. Wildlife habitat values are also low because the vegetation lacks diversity in structure and species composition.

**Other**—As with the POTR/CARO c.t., this type was not identified separately in previous classifications. Similar communities were encountered in southern Utah, but they were included in the *Populus tremuloides—Abies lasiocarpa / Carex geyeri* c.t. (Mueggler and Campbell 1986). Most of the stands in this type are more properly identified as belonging to the POTR-ABLA/CARO c.t.

## *Populus tremuloides/Bromus carinatus* Community Type (POTR/BRCA c.t.)

**Distribution**—This major community type occurs on all of the National Forests within the study area. It is abundant on the Humboldt and Toiyabe National Forests in Nevada where it accounts for 8 and 10 percent of the aspen communities, respectively. It is also common on the Wasatch-Cache National Forest in northern Utah where it accounts for 5 percent of the aspen communities. The type is particularly abundant on the Schell Creek Range in eastern Nevada and on the Bear River Range in northern Utah.

The POTR/BRCA c.t. usually appeared at moderately high elevations. The lowest elevation was 6,200 ft (1,900 m) in eastern Idaho and the highest was 10,000 ft (3,000 m) in central Utah. Three-fourths of the stands grew at elevations over 8,000 ft (2,400 m). Most were found on slopes, some very steep, but the type does not appear limited by exposure or confined to soils of any particular parent material.

**Vegetation**—The vegetation is structurally simple and is typified by the absence of a conspicuous conifer element in the tree layer, a lack of a well-defined shrub layer, and

Figure 20—The *Populus tremuloides/Bromus carinatus* c.t. is a grazing-altered type that occurs throughout the Region but is particularly common in Nevada. The undergrowth is characterized by an abundance of one or more of the tall grasses, *B. carinatus, Elymus glaucus*, or *Agropyron trachycaulum*, and general scarcity of tall forbs.

an herbaceous layer dominated by one or more of the following tall grasses: *Bromus carinatus, Elymus glaucus*, or *Agropyron trachycaulum* (fig. 20). Other graminoids frequently abundant are *Melica spectabilis, Poa pratensis*, and sometimes *Carex hoodii* and *Stipa occidentalis*. The most common forbs are the low-growing *Stellaria jamesiana, Achillea millefolium, Thalictrum fendleri*, and *Taraxiacum officinale*. Occasionally, *Lathyrus* spp. or *Vicia americana* are abundant. Tall-growing forbs such as *Agastache urticifolia, Hackelia floribunda, Rudbeckia occidentalis*, and *Senecio serra* may be present but never in sufficient quantity to qualify as a POTR/TALL FORB type. Annuals such as *Polygonum douglasii, Nemophila breviflora*, and *Collomia linearis* are occasionally abundant. Some shrubs may be present but they do not form a distinct layer. In fact, over half the 77 stands sampled in this type contained small amounts of *Symphoricarpos oreophilus* and about a fifth contained small quantities of *Rosa woodsii*. Most of the time the stands have distinctly grassy undergrowth with a scattering of forbs. In some instances, where past grazing has been heavy, the undergrowth is sparse and only remnants of the identifying species remain with annuals.

**Succession**—Although in most cases the aspen overstory appears to be stable in the POTR/BRCA c.t., the undergrowth is considerably altered by grazing. The type is most likely seral to the POTR/TALL FORB climax community type. Heavy and prolonged sheep use has reduced the abundance of tall forbs and permitted substantial increases in the amount of *B. carinatus, E. glaucus*, and *A. trachycaulum*. The type is similar to the *Populus tremuloides / Symphoricarpos oreophilus / Bromus carinatus* c.t. except for lesser amounts of *S. oreophilus*, which tends to decrease with heavy sheep use. It is thus possible that the POTR/BRCA c.t. may also be a grazing-induced seral stage of the POTR/SYOR/TALL FORB climax community type. Heavy grazing by cattle would tend to reduce the amount of *B. carinatus, A. trachycaulum*, and *E. glaucus* and enable an increase in *R. occidentalis, P. pratensis*, and *T. officinale*. *Abies lasiocarpa* occurred in about a fourth of the stands but only in minor quantities. Conceivably, given sufficient time, these stands might eventually succeed to dominance by this conifer.

**Production**—Total stand basal area, of which 98 percent was aspen, averaged a moderate 149 $ft^2$/acre (34.1 $m^2$/ha). Two-thirds of the stands should have basal areas between 89 and 209 $ft^2$/acre (20.4 and 48.0 $m^2$/ha). Both site index and volume growth of aspen were in the midthird percentile of all stands sampled. Site index at 80 years for the 32 stands sampled averaged 54 ft (16.3 m), with two-thirds of the stands expected to range between 45 and 63 ft (13.7 and 19.2 m). Average volume production at stand maturity averaged 44 $ft^3$/acre/year (3.1 $m^3$/ha/year), with two-thirds of the stands between 32 and 56 $ft^3$/acre/year (2.2 and 3.9 $m^3$/ha/year). Although highly variable, aspen reproduction was good at 2,748 suckers/acre (6,791/ha), ranking the type within the upper quarter of all aspen stands. Tree density was moderate, averaging 785 stems/acre (1,939/ha).

Annual production of undergrowth ranked in the upper third of all aspen stands, averaging 1,111 lb/acre (1,245 kg/ha) of air-dry herbage. Two-thirds of the stands should produce somewhere between 719 and 1,503 lb/acre (805 and 1,683 kg/ha). Graminoids and forbs contributed about equally to this production, with 52 and 47 percent, respectively. Shrubs were only 1 percent of the total.

This undergrowth was only moderately suitable as forage, with 41 percent categorized as desirable, 45 percent intermediate, and 14 percent least desirable.

The POTR/BRCA c.t. is thus considered moderately productive of wood fiber and above average in livestock forage production. The abundance of graminoids and lack of shrubs suggest that it is generally more suitable as summer range for cattle than it is for sheep. Wildlife habitat values are comparatively low because of the lack of diversity in both vegetation structure and species composition. Essentially, the type has only the two strata: an aspen overstory underlain by herbaceous undergrowth.

**Other**—This type remains the same as identified in the Utah aspen classification (Mueggler and Campbell 1986). It was not identified separately in either the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981) or in the Caribou and Targhee National Forests classifications (Mueggler and Campbell 1982). However, a minor portion of the stands identified as part of the *Populus tremuloides/Poa pratensis* c.t. in the latter classification is more properly included in the current POTR/BRCA type.

This seral type has not been reported to occur elsewhere. Because it is believed to represent a grazing-degraded stage of the POTR/TALL FORB type, which appears to be present in southeastern Wyoming and in Colorado, this seral type probably occurs there as well.

## *Populus tremuloides/Symphoricarpos oreophilus/Bromus carinatus* Community Type (POTR/SYOR/BRCA c.t.)

**Distribution**—This major, disturbed community type was observed on all National Forests within the study area except the Bridger-Teton and Targhee. It is fairly common in northern and central Utah and Nevada. It appears to be particularly abundant on the Schell Creek and the northern end of the Toiyabe Ranges of Nevada and on the Bear River Range and Tavaputs Plateau of northern Utah.

The POTR/SYOR/BRCA c.t. is an intermediate elevation type ranging from a low of 6,400 ft (2,000 m) on the Wasatch-Cache National Forest to a high of 9,900 ft (3,000 m) on the Humboldt. Almost 90 percent of the stands sampled, however, were between 7,000 and 9,000 ft (2,100 and 2,700 m). Most of the stands were on shallow slopes, less than 25 percent steepness, and equally common on all aspects and soil parent materials.

**Vegetation**—The vegetation reflects considerable alteration caused by livestock grazing. It is characterized by the exclusive dominance of aspen in the tree layer, the presence of a distinct layer of low shrubs dominated almost exclusively by *Symphoricarpos oreophilus*, the absence of a distinct tall shrub layer, and an herb layer dominated primarily by the tall-growing grasses *Bromus carinatus*, *Agropyron trachycaulum*, and *Elymus glaucus* (fig. 21). This tall grass dominance is largely by default in the absence of prominent amounts of tall forbs, characterizing low forbs, and the graminoids *Calamagrostis rubescens* and *Carex geyeri*. Low forbs are always present but seldom abundant. This is especially true with *Geranium viscosissimum*, *Thalictrum fendleri*, and *Osmorhiza chilensis*. Occasionally, *Stellaria jamesiana* and *Taraxacum officinale* are abundant. *Rosa woodsii* and *Berberis repens* are frequently present in the shrub stratum. In some instances *Stipa occidentalis* may be an abundant grass. Although annuals are often present, they are seldom abundant. Occasionally, such conifers as *Abies lasiocarpa* and *Pseudotsuga menziesii* may be present in the tree layer or as reproduction, but they too are never abundant.

**Succession**—This is primarily a stable aspen type but with undergrowth that is in a successional stage leading to a POTR/SYOR/TALL FORB climax community type. A paucity of the tall forbs that commonly typify the POTR/SYOR/TALL FORB type and the proportionately greater role of such tall grasses as *B. carinatus, E. glaucus,* and *A. trachycaulum* are attributed to grazing influences, probably by sheep. Heavy, continued grazing pressure could lead to more pronounced changes, such as a decrease in *S. oreophilus*, and replacement of the remaining desirable perennial herbs with yet greater amounts of *Poa pratensis*, *T. officinale*, and *S. jamesiana*. In those few instances where conifers appear to be slowly invading, the communities in this type may be successional to either *A. lasiocarpa* or *P. menziesii* coniferous forest climax series.

**Production**—Stand basal area for the 10 stands sampled for production ranks in the lower quarter of all types. Average basal area, almost all of which was aspen, was only 104 ft$^2$/acre (23.8 m$^2$/ha). Two-thirds of the stands should produce between 90 and 118 ft$^2$/acre (20.7 and 17.1 m$^2$/ha). However, site index and estimated volume growth of aspen is at least moderate, ranking in the mid-third percentile of all stands. Site index averaged 47 ft (14.5 m), with two-thirds of the stands expected to fall between 41 and 53 ft (12.5 and 16.2 m). Estimated volume growth at maturity averaged 36 ft$^3$/acre/year (2.5 m$^3$/ha/year), with two-thirds of the stands producing between 29 and 43 ft$^3$/acre/year (2.0 and 3.0 m$^3$/ha/year). Aspen reproduction, though highly variable from stand to stand, ranked in the upper tenth of all stands at 6,451 suckers/acre (15,904/ha). Tree density was also high, averaging 1,005 stems/acre (2,483/ha).

Undergrowth production averaged a moderate 1,008 lb/acre (1,130 kg/ha), with two-thirds of the stands expected to produce between 292 and 1,724 lb/acre (327 and 1,931 kg/ha). Forbs at 47 percent usually formed the greater part of this production followed closely by graminoids at 39 percent. Shrubs are much more productive here than in the POTR/BRCA c.t., accounting for 14 percent of the total annual production of undergrowth. This undergrowth is considered moderately suitable as livestock forage, with 42 percent classified as desirable, 46 percent as intermediate, and 12 percent as least desirable.

Thus, the POTR/SYOR/BRCA c.t. is slightly less productive of wood fiber and of forage than the related POTR/BRCA c.t. Its moderate forage-producing capabilities appear about equally suited for either sheep or cattle. This type is better for wildlife habitat than the POTR/BRCA c.t. because of the presence of a shrub stratum that improves the diversity of vegetation structure and overall hiding cover.

Figure 21—The *Populus tremuloides/Symphoricarpos oreophilus/Bromus carinatus* c.t. is similar to the POTR/BRCA c.t. except for the presence of a layer of low shrubs intermixed with the tall grass-herb stratum. This grazing-induced type is most common in northern and central Utah and Nevada.

**Other**—This seral community type is the same as that described in the Utah aspen classification (Mueggler and Campbell 1986). Communities of this description were not encountered in either Idaho or Wyoming and thus were not included in earlier classifications.

## MINOR ASPEN COMMUNITY TYPES

### *Populus tremuloides/Wyethia amplexicaulis* Community Type (POTR/WYAM c.t.)

**Distribution**—This minor community type is confined primarily to the northern part of the Region. It was observed only on the Bridger-Teton, Targhee, Caribou, Wasatch-Cache, and Humboldt National Forests. The type appeared most frequently in northeastern Nevada on the Jarbidge and Independence Ranges of the Humboldt; it was also observed on the East Humboldt and Santa Rosa Ranges. The type occurs along the Wyoming and Salt River Ranges of Wyoming and intermittently in Idaho from the Bear River Range north to the Centennials.

The POTR/WYAM c.t. is a low-elevation type. Three-fourths of the 30 stands sampled were below 7,000 ft (2,100 m). It usually occurs on fairly gentle terrain with slopes seldom exceeding 25 percent. The type generally occupies fairly heavy, clayey soils, particularly in Idaho and Wyoming.

**Vegetation**—The vegetation of the POTR/WYAM c.t. lacks structural diversity. Stands commonly consist of a rather open tree stratum of *Populus tremuloides* over an herbaceous undergrowth dominated largely by the relatively broad-leaved *Wyethia amplexicaulis* (fig. 22). Occasionally, shrubs are present, primarily *Symphoricarpos oreophilus* and sometimes *Amelanchier alnifolia*, but they are not abundant enough to form a distinct stratum. *Wyethia amplexicaulis* either completely dominates the undergrowth or is sufficiently abundant to suggest potential dominance. Other fairly common and abundant forbs are *Senecio serra*, *Hackelia floribunda*, and *Taraxacum officinale*. Grasses frequently are an important part of the herbaceous complex. Most commonly encountered of these are *Bromus carinatus*, *Agropyron trachycaulum*, and *Poa pratensis*. Occasionally, *Elymus glaucus* is abundant. Annual forbs such as *Nemophila breviflora* and *Galium bifolium* are sometimes fairly common.

**Succession**—The aspen overstory is not subject to replacement by conifers. The type is thus successionally stable with respect to the tree overstory. However, the undergrowth of some stands has been appreciably altered by abusive livestock grazing as evidenced by the overwhelming dominance of the unpalatable *W. amplexicaulis* in an environment that is supportive of palatable grasses and forbs. Extreme examples occur in meadows and on gentle slopes that appear to be almost exclusively occupied by dense cover of *W. amplexicaulis* under open stands of aspen.

**Production**—Aspen usually grows in rather open, parklike stands in this type. It is one of the least productive types for growth of any of the community types, averaging only 74 $ft^2$/acre (17.0 $m^2$/ha) of basal area. Site index for aspen at 80 years was only 30 ft (9.1 m), and estimated aspen volume production at stand maturity 13 $ft^3$/acre/year (0.9 $m^3$/ha/year). All three of these measures of tree

Figure 22—The *Populus tremuloides/Wyethia amplexicaulis* c.t., a distinctive type encountered occasionally in the northern part of the Intermountain Region, is characterized by a rather open stand of aspen under which the broad-leaved forb *W. amplexicaulis* dominates. The type generally occupies fairly heavy, clayey soils.

productivity fell within the lowest 10 percent of all aspen stands. Aspen reproduction was a relatively poor 252 suckers/acre (621/ha), with a moderate density of trees averaging 664 stems/acre (1,640/ha).

Total production of undergrowth was a relatively good 1,176 lb/acre (1,319 kg/ha), which is within the upper third percentile of all stands. However, this undergrowth was primarily forbs at 89 percent. The unpalatable *W. amplexicaulis* was usually the dominant forb species. Of the undergrowth, 10 percent consisted of graminoids and only 1 percent of shrubs. Suitability of the undergrowth as forage was generally in the lowest quarter of all stands sampled, with 39 percent classified as desirable, 28 percent as intermediate, and 33 percent as least desirable. The type thus is considered relatively poor livestock range despite the above-average production of undergrowth. It is also poor habitat for wildlife because of the small amount of structural diversity in the vegetation and poor species diversity.

**Other**—The POTR/WYAM c.t. was recognized by this name in both the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981) and in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982). Because it rarely occurs in Utah, the type was not included in the Utah classification (Mueggler and Campbell 1986). Communities have not been reported in either Colorado or southeastern Wyoming. However, because it is fairly common in adjacent Idaho on the Targhee National Forest, the type can likely be encountered in southwestern Montana.

## *Populus tremuloides/Artemisia tridentata* Community Type (POTR/ARTR c.t.)

**Distribution**—This minor type was observed on the Bridger-Teton National Forest in western Wyoming, on the Wasatch-Cache, Ashley, Uinta, and Fishlake National Forests in Utah, and on the Humboldt and Toiyabe National Forests in Nevada. It was most abundant on the Toiyabe where it accounted for 12 percent of the sampled stands. It was not common elsewhere. It is a mid-elevation type. All 27 stands sampled grew between 6,900 and 9,400 ft (2,100 and 2,900 m). Most were on less than 40 percent slopes and were not confined by either exposure or soil parent rock. This type occurs as an ecotone or as small single-clone islands between the sagebrush-grass steppes and the less arid aspen or conifer forests, particularly in the northern part of the Region.

**Vegetation**—Conifers are seldom present either in the overstory or as regeneration. The vegetation is characterized by the presence of at least 10 percent canopy cover of *Artemisia tridentata* in the shrub layer (fig. 23), even though *Symphoricarpos oreophilus* or *Juniperus communis* may be more abundant at times. Tall shrub species seldom occur, and they are never abundant. *Artemisia tridentata* may also be present in other community types but only as a minor constituent of undergrowth clearly dominated by other vegetation. The herbaceous undergrowth of the POTR/ARTR c.t. is generally species poor.

Figure 23—Although usually scarce elsewhere, the *Populus tremuloides/ Artemisia tridentata* c.t. is rather common on the Toiyabe National Forest in Nevada. It occupies relatively dry sites and is characterized by the conspicuous presence of *A. tridentata* in the shrub stratum beneath a rather sparse aspen overstory.

The most common graminoids are *Agropyron trachycaulum* and *Stipa occidentalis*. A variety of other species may be encountered but not regularly. Some, however, such as *Stipa comata*, *Poa fendleriana*, *Carex rossii*, *C. geyeri*, and *Bromus ciliatus*, may be fairly abundant when they are present. Forbs and annuals are usually rather sparse, and no single species is characteristic of the type. *Taraxacum officinale*, which occurred in almost two-thirds of the stands, was among the most common forbs. Other forbs that were relatively common in at least a third of the stands were *Antennaria microphylla*, *Lupinus argenteus*, *Achillea millefolium*, and *Stellaria jamesiana*.

**Succession**—The POTR/ARTR c.t. is believed to have a relatively stable aspen overstory most of the time. However, in some stands the aspen overstory was slowly degenerating and not being replaced by reproduction. Failure of the aspen to successfully reproduce could be attributable at least in part to constant browsing by livestock, but perhaps other factors such as disease or climatic change could be involved. In any event, the aspen community is gradually being replaced by sagebrush steppe. Heavy livestock grazing is rather typical in this type, likely resulting in considerable alteration of the undergrowth, reflected particularly in the paucity of palatable forbs.

**Production**—The POTR/ARTR c.t. is the least productive aspen type in the Region for tree growth. Total tree basal areas in the two stands sampled for productivity averaged only 56 ft$^2$/acre (12.8 m$^2$/ha). Only 8 percent of this consisted of conifers. Site index for aspen averaged 29 ft (8.9 m), and estimated aspen volume growth at maturity averaged 12 ft$^3$/acre/year (0.8 m$^3$/ha/year). Despite low tree productivity, both the number of trees and aspen reproduction were in at least the mid-range for all aspen stands. An average of 1,865 suckers were observed per acre (4,607/ha) and 546 trees/acre (1,349/ha).

Annual production of undergrowth averaged in the middle third percentile of all aspen stands, producing 715 lb/acre (802 kg/ha) of air-dry material. This undergrowth usually consisted of a good balance of different vegetation classes. Graminoids averaged 42 percent, shrubs 30 percent, and forbs 8 percent. The suitability of this undergrowth as forage for livestock was among the highest of any of the aspen types, with 76 percent classified as desirable and 19 percent as intermediate. Thus, although the type may be poor from the standpoint of producing wood fiber, it ranks above average as summer range for livestock. It is of moderate value as wildlife habitat.

**Other**—The POTR/ARTR c.t. was recognized by this name in the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981). Communities with this structure and composition were identified in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982) as the *P. tremuloides / A. tridentata—Festuca idahoensis* c.t. The few communities similar in composition and structure that were encountered in Utah were initially placed in a broader *P. tremuloides / J. communis / Sitanion hysterix* c.t. (Mueggler and Campbell 1986). Communities in which *A. tridentata* is a prominent shrub under an aspen canopy have not yet been reported outside of the Intermountain Region.

The type includes a variant dominated by what appears to be pigmy aspen. This variant occurs as small, isolated single-clone groves surrounded by sagebrush steppe. It was observed primarily in eastern Idaho on the southern fringe of the Yellowstone Plateau and along the southern, low-elevation margin of the Centennial Mountains on the Targhee National Forest. The rather dense aspen overstory may be over 25 years old, but the basal diameters of the stems are only 2 to 3 inches (5 to 8 cm) and their heights seldom exceed 10 ft (3 m). Judging from the presence of old dead stems and the lack of evidence of fire, these groves apparently continue to reproduce naturally and persist for long periods. The environment is generally harsh. Some of these pigmy stands have crooked boles, which may be caused by drifting snow. Whether the dwarf nature of the aspen in these clones is genetically or environmentally induced has not been determined.

## *Populus tremuloides/Juniperus communis/Carex geyeri* Community Type (POTR/JUCO/CAGE c.t.)

**Distribution**—The POTR/JUCO/CAGE c.t. is a minor community type that is restricted primarily to the southeastern slope of the Uinta Mountains in northeastern Utah. It is, however, the most frequently encountered type on the Ashley National Forest where it comprised 18 percent of the aspen communities. Examples were also seen on the Wasatch-Cache, Caribou, and Fishlake National Forests but not elsewhere in the Region.

The type occurs at moderately high elevations, considering the latitude of northern Utah; 95 percent of the stands sampled were between 8,000 and 9,000 ft (2,400 and 2,700 m). Most of these stands were on fairly gentle slopes (less than 15 percent steepness) and on all exposures. Although they grew on a variety of soils, almost two-thirds of the soils were derived from sandstone parent rock.

**Vegetation**—The vegetation in the POTR/JUCO/CAGE c.t. is usually clearly defined. Community structure is relatively simple, with the *Populus tremuloides* overstory underlain by a component of low shrub distinguished by the prominence of *Juniperus communis* (fig. 24). Other low shrubs, especially *Symphoricarpos oreophilus* and *Berberis repens*, may also be present and even more abundant than *J. communis*, but the obvious physiognomy of the latter serves as a type indicator. *Juniperus communis* generally grows as separate, low, compact clumps widely scattered beneath the aspen canopy. These clumps frequently are interspersed with *S. oreophilus* or *B. repens*, which may form a substantial part of the shrub layer. The herbaceous stratum contains a high complement of graminoids of which *Carex geyeri* is the usual dominant. Occasionally, *Calamagrostis rubescens* may replace *C. geyeri* in this role. Other common grasses are *Stipa occidentalis*, which occurred in over three-fourths of the 23 stands sampled, and *Agropyron trachycaulum*. Low-growing forbs, particularly *Geranium viscosissimum*, *Astragalus miser*, *Lupinus argenteus*, and *Taraxacum officinale*, can be fairly abundant in some stands. Other forbs with moderate to high constancy include *Potentilla gracilis*, *Achillea millefolium*, *Antennaria microphylla*, and *Stellaria jamesiana*. Annual plants are scarce. Conifers, particularly *Pinus contorta* or *Pseudotsuga menziesii*, may be present but are never a prominent part of the tree layer.

**Succession**—Stands are ordinarily in a stable aspen overstory condition. In those few cases where conifers appear able to invade, judging from the presence of conifer reproduction, the stands may be a successional stage within the *Abies lasiocarpa* or *P. menziesii* forest climax

Figure 24—The *Populus tremuloides/Juniperus communis/Carex geyeri* c.t. is common on the south slope of the Uinta Mountains on the Ashley National Forest in northeastern Utah. A low shrub layer in which *J. communis* is a distinctive component, combined with primarily graminoid herb layer usually dominated by *C. geyeri*, characterize the type.

series. Where seral, the type will most likely proceed to either the *Populus tremuloides-Abies lasiocarpa/Juniperus communis* or *P. tremuloides-P. menziesii/J. communis* c.t.'s, which are believed to represent seral stages within the northern Utah *A. lasiocarpa / J. communis* and *P. menziesii/S. oreophilus* habitat types, respectively (Mauk and Henderson 1984). Excessive livestock grazing will likely lead to substantial increases in the amount of *T. officinale*, *A. miser*, *A. millefolium*, and possibly *J. communis* at the expense of the more palatable and less tenacious forage species.

**Production**—Production of trees in the POTR/JUCO/CAGE c.t. is about average for aspen communities in the Region. In the three stands sampled for production, basal area averaged 162 ft²/acre (37.2 m²/ha), site index for aspen at 80 years averaged 48 ft (14.5 m), and estimated volume production of aspen at stand maturity averaged 36 ft³/acre/year (2.5 m³/ha/year). Reproduction of aspen at 1,576 suckers/acre (3,896/ha) averaged in the upper third percentile of all stands. Tree density, however, was close to average for all stands at 842/acre (2,080/ha). The type therefore is moderately productive of wood fiber.

The annual production of undergrowth was in the lower third percentile of all stands. Air-dry production ranged from 415 to 833 lb/acre (465 to 934 kg/ha) and averaged 667 lb/acre (747 kg/ha). This undergrowth was composed primarily of a mixture of graminoids, 45 percent, and forbs, 50 percent. Only 5 percent of the annual herbage growth consisted of shrubs, mostly the unpalatable *J. communis*. Overall suitability of this undergrowth as livestock forage appears to be about average for all aspen stands, with 49 percent classified as desirable and 38 percent as intermediate. The balanced mixture of graminoids and forbs suggests that the type would be about equally suited for cattle and sheep. Wildlife habitat values are limited by the openness of the undergrowth and lack of good hiding cover.

**Other**—Our POTR/JUCO/CAGE c.t. is less inclusive than the community type by the same name described in the Utah classification (Mueggler and Campbell 1986). Somewhat similar communities with a low shrub layer dominated by *J. communis* and *C. geyeri* as the characterizing herbaceous species have been reported from southeastern Wyoming (Alexander and others 1986). These were included as part of a more general *P. tremuloides / C. geyeri* habitat type.

## *Populus tremuloides/Poa pratensis* Community Type (POTR/POPR c.t.)

**Distribution**—The POTR/POPR c.t. is a grazing-induced type that, although not common, is fairly widespread across the Region. It occurs in Utah from the Bear River and Uinta Mountains in the north to the Markagunt Plateau and Abajo Mountains to the south, and in Nevada from the Jarbidge Mountains in the north to the Schell Creek Range in the south. It is an intermediate elevation type, with almost three-fourths of the 20 stands sampled at elevations between 7,000 and 9,000 ft (2,100 and 2,700 m). Most of these stands were on flat to gently sloping benches, lower slopes, or along stream bottoms. Soil parent material does not appear restrictive.

**Vegetation**—The vegetation of this altered type is simple in both structure and species composition. Although shrubs may be present in minor quantities, they are never abundant enough to form distinct strata, and intense past grazing has caused a reduction in diversity of the herbaceous undergrowth. The tree overstory may contain occasional conifers, especially *Abies lasiocarpa* or *Picea engelmannii*. Shrubs such as *Symphoricarpos oreophilus*, *Juniperus communis*, *Rosa woodsii*, and *Berberis repens* may be present occasionally in the undergrowth. However, neither the conifers nor shrubs are a prominent part of the vegetation complex. The undergrowth is primarily low-growing forbs and grasses, of which *Poa pratensis* usually dominates (fig. 25). Other grasses most often present are *Agropyron trachycaulum* and *Bromus carinatus*. The most common and usually most abundant forbs are *Taraxacum officinale* and *Achillea millefolium*. A wide variety of other forbs have been encountered in this type, such as *Thalictrum fendleri*, *Osmorhiza chilensis*, *Geranium viscosissimum*, and *Astragalus miser*, but they have low constancy and are seldom abundant when they do occur. Occasionally, a species such as *Trifolium longipes* will be abundant. Annuals do not appear to be an important part of the undergrowth.

**Succession**—A variety of conifers that now occur as incidentals may eventually come to dominate the tree layer. Stands with this potential for conifer dominance should be considered successional to a coniferous forest climax series, probably the *A. lasiocarpa*. Other stands show no evidence of invasion by conifers and appear to have relatively stable aspen overstories. However, the undergrowth of all stands reflects a long history of overgrazing of community types in which palatable shrubs and herbs once dominated. Judging from current composition, the POTR/POPR c.t. may be a grazing-induced stage of any one of the following climax or near-climax community types: POTR/SYOR/THFE, POTR/SYOR/CARU, POTR/THFE, or the POTR/CARU. Although the dominant *P. pratensis* and *T. officinale* are palatable to both cattle and sheep, their growth-form enables them to withstand grazing and increase in abundance as competition from the more grazing-susceptible species is reduced (fig. 26). Continued heavy grazing probably will not further alter the undergrowth appreciably, at least not until the aspen begins to break up with old age and heavy browsing repeatedly suppresses aspen regeneration. If this should happen, the aspen stand will eventually be lost.

**Production**—The POTR/POPR c.t. appears fairly productive of trees. Eight stands were sampled for production. Total tree basal area, 98 percent of which was aspen, averaged 190 ft²/acre (43.7 m²/ha), which was in the upper quarter of all aspen stands. Site index for aspen as well as estimated volume growth at stand maturity, however, were only slightly better than average. Site index at 80 years averaged 54 ft (16.4 m), and volume growth averaged 44 ft³/acre/year (3.1 m³/ha/year). All of these factors were highly variable from stand to stand. Tree density

Figure 25—The *Populus tremuloides/Poa pratensis* c.t. is a fairly widespread minor type containing undergrowth principally comprising low-growing forbs and grasses usually dominated by *P. pratensis*. It is a grazing-induced type that reflects a long history of overgrazing of types such as those in figures 12, 13, 15, and 16.

Figure 26—Prolonged abusive grazing of the *Populus tremuloides/Poa pratensis* c.t. can lead to impoverished undergrowth in which the forb *Taraxacum officinale* predominates.

averaged 888 stems/acre (2,194/ha), which was in the upper third percentile of all stands. Aspen reproduction was moderated at 616 suckers/acre (1,521/ha).

Undergrowth production consisted primarily of graminoids at 53 percent and forbs at 38 percent. Only 9 percent of the current year's growth was shrubs. Total production of undergrowth averaged a moderate 689 lb/acre (772 kg/ha) but varied from 303 to 1,289 lb/acre (340 to 1,445 kg/ha). Overall suitability of the undergrowth as forage for livestock was moderate, with only 23 percent of the cover classified as desirable and 75 percent as intermediate. The generally high proportion of graminoids and lack of shrubs suggest that the type would be better summer range for cattle than it would be for sheep. Value of the type as wildlife habitat appears fairly low because of a lack of diversity in both vegetation structure and species composition caused by an intense history of past grazing.

**Other**—The POTR/POPR c.t. was identified previously by this name in the Utah aspen classification (Mueggler and Campbell 1986). The Caribou and Targhee National Forests classification (Mueggler and Campbell 1982) uses this community type name, but the type contains more variation in community composition. Although not specifically reported, similar communities probably can be found in Colorado and southeastern Wyoming. The type is probably a grazing-induced seral stage of the POTR/CARU c.t., which apparently does occur in these States (Alexander and others 1986; Hoffman and Alexander 1983).

## *Populus tremuloides/Symphoricarpos oreophilus /Poa pratensis* Community Type (POTR/SYOR/POPR c.t.)

**Distribution**—This minor, grazing-altered type is widespread across Utah from the Bear River Mountains in the north to the Pine Valley Mountains in the southwest. The type is common on the Manti-LaSal National Forest where it accounted for 8 percent of the communities sampled, and on the Dixie National Forest where it accounted for 7 percent of the stands. It is most abundant in the Abajo Mountains and on the Aquarius Plateau. It was seen only occasionally elsewhere in Utah. The type was not observed in Idaho or Wyoming, and only in the Schell Creek Range of eastern Nevada. This is an intermediate elevation type with over 80 percent of the 36 stands sampled at elevations between 7,000 and 9,000 ft (2,100 and 2,700 m). Most of these stands occupied gentle (less than 10 percent) slopes. Although they were observed growing on a wide variety of soils, the majority were on either sandstone parent material (47 percent) or on volcanics (29 percent).

**Vegetation**—The vegetation of this community type appears considerably degraded by grazing. It is similar to that of the POTR/POPR c.t. except that it has a shrub stratum. The overstory is dominated by *Populus tremuloides*.. Although conifers may be present in some stands, they are never prominent. The low shrub layer is dominated by *Symphoricarpos oreophilus*, sometimes with substantial quantities of *Rosa woodsii*. The tall shrubs *Amelanchier alnifolia* or *Prunus virginiana* are occasionally present but are never abundant enough to form a distinct stratum. The herbaceous undergrowth is usually dominated by the graminoid *Poa pratensis*. The low-growing forbs *Taraxacum officinale* and *Achillea millefolium* are common. Other common forbs are *Agastache urticifolia*, *Hackelia floribunda*, *Geranium viscosissimum*, and *Lupinus argenteus*, but these are never abundant. *Vicia americana* or *Lathyrus* spp. may sometimes be abundant.

**Succession**—The aspen overstory of most stands within this type is stable, with little evidence of replacement by conifers. Occasionally, however, minor amounts of conifers are present and, conceivably, could gradually replace *P. tremuloides* as the overstory dominant tree. If so, then some stands within the POTR/SYOR/POPR c.t. should be considered seral stages within a wide range of coniferous forest series, from *Abies lasiocarpa* to *Pinus ponderosa*. The undergrowth of all stands within the type reflects a long history of heavy grazing. The presence of some species, which in greater quantities serve as indicators of other community types, suggests that this type is a grazing-degraded stage of several climax community types, particularly the POTR/SYOR/TALL FORB and the POTR/SYOR/THFE. The growth characteristics of *P. pratensis* and *T. officinale*, the dominant herbs, enable them to withstand intensive grazing remarkably well. These two palatable species are able to increase under abusive grazing because of reduced competition from the more grazing-sensitive species that are equally or even less palatable to livestock. Continued abusive grazing will probably cause depletion of the shrub stratum, particularly *S. oreophilus*, and conversion to a POTR/POPR c.t.

**Production**—The POTR/SYOR/POPR c.t. is considerably less productive of trees and more productive of undergrowth than the closely associated POTR/POPR c.t. A total of 11 stands were sampled for production. Total tree basal area averaged 106 $ft^2$/acre (24.4 $m^2$/ha), which was in the lower quarter of all stands. Aspen site index and volume production, however, were in the mid-third percentile range, with site index averaging 50 ft (15.3 m) and volume at stand maturity averaging 40 $ft^3$/acre/year (2.8 $m^3$/ha/year). Both aspen reproduction and tree density ranked in the mid-third percentile of all stands. Reproduction averaged 1,285 suckers/acre (3,176/ha), and trees averaged 722 stems/acre (1,784/ha).

Annual production of undergrowth averaged 1,533 lb/acre (1,719 kg/ha), which was in the upper quarter of all aspen stands in the Region. However, this varied greatly from stand to stand, ranging from a low of 654 to a high of 2,537 lb/acre (733 to 2,844 kg/ha). This production was generally well distributed among the different vegetation classes, with an average 40 percent graminoids, 38 percent forbs, and 22 percent shrubs. As with the POTR/POPR c.t., suitability as livestock forage was only moderate. Only 28 percent fell into the desirable category and 63 percent into intermediate. The type is moderate to good summer range for livestock because of the high overall productivity of the undergrowth. The value of the type as wildlife habitat is moderately good because of the prominence of a shrub stratum.

**Other**—This community type is the same as that identified under this name in the Utah classification (Mueggler and Campbell 1986) and much the same as that identified under the same name in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982).

## *Populus tremuloides/Amelanchier alnifolia/Thalictrum fendleri* Community Type (POTR/AMAL/THFE c.t.)

**Distribution**—This minor community type is widely dispersed across the northern half of the Region from the Yellowstone Plateau in Idaho southward through the Wasatch Range and Uinta Mountains in northern Utah. It is also present in the Ruby, East Humboldt, Jarbidge, and Independence mountain ranges of northeastern Nevada. The POTR/AMAL/THFE c.t. is a fairly low elevation type, with over two-thirds of the stands growing below 7,000 ft (2,100 m). Most stands grew on moderately steep, concave to undulating slopes and on both igneous and sedimentary soil parent materials.

**Vegetation**—The vegetation is characterized by exclusive dominance of *Populus tremuloides* in the overstory, prominence of tall shrubs in the undergrowth, lack of a distinct stratum of low shrubs, and an herbaceous layer dominated by low-growing forbs. *Amelanchier alnifolia* and *Prunus virginiana* are usually the most common tall shrubs, but *Acer grandidentatum* is abundant in some stands. Although low shrubs such as *Symphoricarpos oreophilus* and *Rosa woodsii* are frequently present, they are not prominent. *Berberis repens* is commonly encountered. The herbaceous layer is usually a mixture of a wide variety of grasses and forbs. Consequently, species diversity can be fairly great. The most often encountered and abundant forbs are *Thalictrum fendleri*, *Osmorhiza chilensis*, *Smilacina stellata*, and *Geranium viscosissimum*. The most common and abundant grasses are *Elymus glaucus* and *Poa pratensis*. A variety of annual plants, particularly *Nemophila breviflora* and *Galium aparine*, may be present but are seldom abundant.

**Succession**—The POTR/AMAL/THFE c.t. is a stable aspen type with little evidence of possible replacement of the tree overstory with conifers. The type in general, and certain communities in particular, show the effects of grazing impacts by the abundance of such species as *P. pratensis* and *E. glaucus* that tend to increase under grazing, especially by sheep. Judging from the occasional presence of modest amounts of certain tall forbs, some of the communities in this type may be grazing-degraded stages of a *P. tremuloides / A. alnifolia*/Tall Forb climax community type.

**Production**—Four stands were sampled for production. Total tree basal area averaged 129 ft$^2$/acre (29.6 m$^2$/ha), 98 percent of which was aspen. Site index at 80 years for aspen averaged 45 ft (13.8 m), and volume production of aspen wood at stand maturity averaged 33 ft$^3$/acre/year (2.3 m$^3$/ha/year). All of these tree productivity measures ranked in the mid-third percentile of all aspen stands. Aspen reproduction was high, ranking in the upper quarter of all stands at an average 5,203 suckers/acre (12,858/ha). Tree density was also in the upper quarter of all stands with an average of 1,382 stems/acre (3,414/ha). The potential of this type for the production of wood fiber appears to be about average for all aspen types in the Region.

Annual production of undergrowth is also moderate, averaging 990 lb/acre (1,109 kg/ha), which is in the mid-third percentile range for all stands. Shrubs are a major part of this at an average 39 percent. The remainder consists of a mixture of forbs at 38 percent and graminoids at 23 percent. The undergrowth is about average in suitability as forage for livestock with 40 percent classified as desirable and 56 percent as intermediate. As summer range for livestock, then, the type is in the mid-range of both productivity and suitability. It is probably much better range for sheep than it is for cattle because of the abundance of both shrubs and forbs. Considerable diversity in the structure of the undergrowth suggests that the type is better than average habitat for wildlife.

**Other**—This type name was not used in previous classifications. Communities with this composition were included as portions of other more general types. A major part of the *P. tremuloides / A. alnifolia—Calamagrostis rubescens* type described in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982) now belongs to this type. A minor portion of the *P. tremuloides / P. virginiana / Carex geyeri* type of the Utah classification (Mueggler and Campbell 1986), and a minor part of the *P. tremuloides / P. virginiana* type of the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981), now belong to this type. The type has not been reported to occur outside of the Intermountain Region.

## *Populus tremuloides/Amelanchier alnifolia*/Tall Forb Community Type (POTR/AMAL/TALL FORB c.t.)

**Distribution**—This minor type is similar to the POTR/AMAL/THFE c.t. in being widely distributed throughout the northern half of the Region, but it is somewhat more abundant. The type occurs on the Yellowstone Plateau in Idaho southward through the Wasatch Range in northern Utah. It occurs most frequently on the Humboldt National Forest, especially in the Independence and Jarbidge Mountains of northeastern Nevada. On the Humboldt, 7 percent of the aspen communities were of this type.

The POTR/AMAL/TALL FORB c.t. is a low to moderate elevation type with 90 percent of the stands below 8,000 ft (2,400 m) and two-thirds of the stands below 7,000 ft (2,100 m). The majority of the stands grew on moderately steep, northerly facing slopes, usually at the mid-slope or low-slope positions. The type does not appear to be restricted by soil parent material.

**Vegetation**—The vegetation has a pronounced multilayered structure. Beneath the virtually pure *Populus tremuloides* tree canopy is a layer of tall shrub species. Below the shrub layer is a mixture of tall forbs, low forbs, and graminoids. In some cases, the shrubby undergrowth is so dense that penetration is difficult. The prominence of *Prunus virginiana, Amelanchier alnifolia*, and in some cases *Acer grandidentatum*, identifies this as part of the tall shrub undergrowth type. Although low shrubs such as *Symphoricarpos oreophilus* are frequently present, they are never sufficiently abundant to form a separate stratum. The herbaceous layer is characterized by the prominence of one or more members of the tall forb group of species. The most common of these are *Agastache urticifolia, Senecio serra*, and *Hackelia floribunda*. Other members of this group that are frequently present, and at times abundant, include *Osmorhiza occidentalis, Valeriana occidentalis*, and *Aquilegia formosa*. Low-growing forbs are always present and frequently abundant. Most common of these are *Thalictrum fendleri, Osmorhiza chilensis, Stellaria jamesiana*, and *Smilacina racemosa*. Graminoids are most often represented by *Bromus carinatus* and *Elymus glaucus*. Annual forbs are commonly abundant, particularly *Nemophila breviflora* and *Galium aparine*. In many respects this type is similar to the POTR/AMAL-SYOR/TALL FORB c.t. except for the absence of a prominent low shrub layer.

**Succession**—The aspen overstory is probably stable. The tall forb undergrowth, although undoubtedly altered somewhat by livestock grazing, probably represents a climax aspen community type. Past grazing has undoubtedly resulted in some change in the herbaceous undergrowth, such as a reduction in the proportion of palatable and grazing-sensitive tall forbs and grasses, along with a corresponding increase in the less palatable or more grazing-resistant species such as *Poa pratensis, S. jamesiana, T. fendleri*, and other low-growing herbs.

**Production**—Tree productivity ranked in the mid-third percentile of all stands. The productivity factors varied greatly among the nine stands sampled. For example, total tree basal area averaged 124 ft$^2$/acre (28.4 m$^2$/ha) but ranged from 55 to 93 ft$^2$/acre (12.6 to 44.3 m$^2$/ha). Aspen site index at 80 years averaged 47 ft (14.5 m), and volume production at stand maturity averaged 36 ft$^3$/acre/year (2.5 m$^3$/ha/year). Aspen reproduction in the type averaged a high 5,310 suckers/acre (13,121/ha), but tree density was in the mid-third percentile for all stands at 573 stems/acre (1,416/ha). Although the variability between stands is great, the overall potential of the type for the production of wood fiber is about average for all aspen stands..

Annual production of undergrowth was also highly variable between stands. It averaged in the upper third of all stands at 1,103 lb/acre (1,237 kg/ha). Total production ranged between 529 and 1,861 lb/acre (593 and 2,087 kg/ha). The bulk of this production was forbs at 57 percent and shrubs at 30 percent. Only 13 percent was graminoids. Suitability of this undergrowth as livestock forage is somewhat below average, with only 48 percent in the desirable category, 33 percent intermediate, and a substantial 19 percent in the least desirable class. Therefore, even though forage productivity is above average, lower than average suitability of the undergrowth as forage indicates that the type is no better than average summer range for livestock. It is probably more suitable for sheep than for cattle because of the relatively large amounts of shrubs and forbs. The value of the type as wildlife habitat appears fairly high because of the relative abundance of shrubs and overall diversity of vegetation.

**Other**—Both the *P. tremuloides / P. virginiana / S. serra* c.t. of the Utah classification (Mueggler and Campbell 1986), and the *P. tremuloides / A. alnifolia—Calamagrostis rubescens* c.t. of the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982) are more inclusive than the POTR/AMAL/TALL FORB c.t. Consequently, only a minor part of the stands in both of these classifications are included in this type. Most of the other stands in the earlier classifications contain considerable amounts of *S. oreophilus* and are thus in the new POTR/AMAL-SYOR/TALL FORB c.t.

## *Populus tremuloides/Amelanchier alnifolia—Symphoricarpos oreophilus/ Bromus carinatus* Community Type (POTR/AMAL-SYOR/BRCA c.t.)

**Distribution**—This minor type occurs primarily in Utah, but an occasional stand was observed farther north on the Caribou and Bridger-Teton National Forests in Idaho and Wyoming. The type is most abundant on the Bear River and Wasatch Ranges of northern Utah and occurs in the Uinta Mountains and as far south as the Wasatch Plateau. The type was not seen in Nevada.

This low to medium elevation type was not encountered above 7,800 ft (2,400 m). It occupies shallow to moderately steep slopes of all exposures and appears to be favored by soils derived from sedimentary parent materials, particularly sandstone.

**Vegetation**—Few conifers were encountered in the 21 stands sampled. The tree overstory is almost exclusively *Populus tremuloides*. The herbaceous undergrowth of this structurally complex community type has been altered considerably by grazing. The undergrowth is essentially three strata: tall shrubs, low shrubs, and herbs. *Amelanchier alnifolia* and *Prunus virginiana* are the most common and abundant tall shrub species. However, in about of the stands examined *Acer grandidentatum* was prominent. This tall shrub stratum is often broken and somewhat ill defined, but various members of the tall shrub group are, in total, a prominent part of the undergrowth. *Symphoricarpos oreophilus*.usually dominates the low shrub layer. *Rosa woodsii* and *Berberis repens* are also frequently present but not nearly as abundant as *S. oreophilus*. In the northern portion of the Region, *Pachystima myrsinites* frequently is an important constituent of the low shrub stratum. The herbaceous portion of the undergrowth is a highly variable group of species. Those dominating are generally the tall grasses *Elymus glaucus, Bromus carinatus*, and *Agropyron trachycaulum*. *Poa* *pratensis* was abundant in about half the stands. A wide variety of forbs can be encountered, but the tall and low forbs that serve as indicators of other community types are never abundant. The most commonly encountered forbs are *Thalictrum fendleri*, *Geranium viscosissimum*, *Osmorhiza chilensis*, and *Lupinus argenteus*. Small quantities of such tall forbs as *Agastache urticifolia*, *Aster engelmannii*, and *Senecio serra* are not unusual. Occasionally, an abundance of *Lathyrus* spp. or *Vicia americana* grow matlike over the low shrubs and herbs. Annuals usually are not abundant.

**Succession**—The majority of stands examined in the POTR/AMAL-SYOR/BRCA c.t. appear to be stable with respect to the tree component. They will likely remain aspen-dominated communities. The undergrowth, however, appears to have undergone considerable change because of grazing. The relative abundance of graminoids, particularly *P. pratensis*, and a paucity of more palatable forbs suggest that heavy use by sheep may be responsible. Tall forbs are fairly common though not abundant suggesting that the type might be a grazing-induced seral stage of a POTR/AMAL-SYOR/TALL FORB climax community type. Prolonged abusive grazing would result in a further reduction of the palatable forbs and shrubs and eventually convert stands within this type to either a POTR/SYOR/BRCA, POTR/BRCA, or perhaps even a POTR/POPR c.t.

**Production**—The POTR/AMAL-SYOR/BRCA c.t. rates in the lower 25 percent of all stands for tree production as measured by total tree basal area but is within the mid-third percentile for the measures of aspen site index and annual volume increment at stand maturity. Nine stands sampled for productivity had tree basal area of only 103 $ft^2$/acre (23.7 $m^2$/ha), aspen site index of 49 ft (14.8 m), and wood volume production of 37 $ft^3$/acre/year (2.6 $m^3$/ha/year). Although aspen reproduction averaged a high 2,786 suckers/acre (6,886/ha), tree density was moderate at 709 stems/acre (1,752/ha). These measures suggest, then, that the overall potential of the type for the production of wood fiber is about average for aspen types within the Region.

Annual production of undergrowth, on the other hand, ranked in the upper third percentile of all stands, averaging 1,120 lb/acre (1,255 kg/ha). Variability between stands was high, ranging from 510 to 1,554 lb/acre (572 to 1,742 kg/ha). Most of this production consisted of vegetation of moderate forage suitability. An average 62 percent was forbs, 26 percent graminoids, and the remaining 12 percent shrubs. The undergrowth is thus above average in value as summer range for livestock. The abundance of forbs suggests that it would be better range for sheep than for cattle. Wildlife habitat values are relatively good because of the diverse vegetation structure contributed by the tall and low shrub cover.

**Other**—Stands with this composition were not recognized as a separate category in earlier classifications.

## *Populus tremuloides—Abies lasiocarpa/Symphoricarpos oreophilus*/Tall Forb Community Type (POTR-ABLA/SYOR/TALL FORB c.t.)

**Distribution**—This minor type occurs primarily in northern Utah. Occasionally, stands were observed farther north on the Bridger-Teton and Caribou National Forests as well as farther south on the Fishlake and Manti-LaSal National Forests. The greatest concentration is along the Wasatch and Bear River Ranges in northern Utah. The type was not seen in Nevada. The POTR-ABLA/SYOR/TALL FORB c.t. is a moderately high elevation type with 90 percent of the sampled stands between 7,000 and 9,000 ft (2,100 and 2,700 m). The type occupied moderately steep slopes of all exposures, but most were on a concave or undulating slope surface. Most of the stands grew on soils derived from sedimentary parent materials.

**Vegetation**—This type is characterized by the presence and projected increasing abundance of *Abies lasiocarpa* in the tree layer, the absence of a prominent tall shrub stratum, the presence of a low shrub stratum, and herbaceous undergrowth in which members of the tall forb group are prominent. Communities generally have a high level of species diversity. Undergrowth composition is fairly similar to that of the POTR/SYOR/TALL FORB c.t. The low shrub stratum is usually dominated by *Symphoricarpos oreophilus*. *Rosa woodsii* is frequently present, and *Pachystima myrsinites* can often be abundant. The herb layer usually is a rich composite of forbs and graminoids. The most commonly encountered tall forbs are *Aster engelmannii*, *Valeriana occidentalis*, *Senecio serra*, *Agastache urticifolia*, *Mertensia arizonica*, and *Hackelia floribunda*. In about half the 20 stands examined, *Rudbeckia occidentalis* was abundant. The tall forbs were always accompanied by a mixture of low-growing forbs, most often *Thalictrum fendleri*, *Osmorhiza chilensis*, *Geranium viscosissimum*, *Stellaria jamesiana*, and *Fragaria vesca*. Occasionally, *Lathyrus* spp. or *Vicia americana* or both form a mat growth over this low shrub and forb complex. Annuals were often common, particularly *Nemophila breviflora*. The tall grasses, *Bromus carinatus*, *Agropyron trachycaulum*, and *Elymus glaucus*, frequently form a conspicuous part of the herb layer. At times, *Poa pratensis* is abundant.

**Succession**—The POTR-ABLA/SYOR/TALL FORB c.t. represents a successional stage within the *A. lasiocarpa* climax coniferous forest series, most likely within the *A. lasiocarpa* / *O. chilensis* habitat type (appendix E). As *A. lasiocarpa* gains increasing dominance of the tree overstory, shading intensity increases. *Populus tremuloides* fails to sucker, and the highly productive and diverse undergrowth changes to a less complex assemblage of species. The tall forbs, grasses, and shrubs will decrease in importance, whereas *O. chilensis*, *T. fendleri*, and *S. jamesiana* will increasingly dominate the undergrowth. Heavy grazing will usually lead to a decrease of many of the tall forbs, especially *A. urticifolia, A. engelmannii*, and *S. serra*, and an increase in *R. occidentalis, H. floribunda, S. jamesiana, F. vesca*, and possibly *Lathyrus* spp. Prolonged abusive grazing can lead to a substantial increase in *P. pratensis* and *Taraxacum officinale* or even replacement of the perennial shrubs and herbs with annuals such as *N. breviflora, Collomia linearis*, and *Polygonum douglasii*.

**Production**—All production measurements of trees indicate that the type ranks in the mid-third percentile of the Region's aspen stands. Total tree basal area averaged 149 ft$^2$/acre (34.1 m$^2$/ha); 88 percent of this was aspen and the remainder was conifers. The average site index at 80 years for aspen was 51 ft (15.4 m), with an estimated wood volume production at stand maturity of 40 ft$^3$/acre/year (2.9 m$^3$/ha/year). Both aspen reproduction at 731 suckers/acre (1,807/ha) and tree density at 699 stems/acre (1,727/ha) were in the mid-third percentile of all aspen stands.

Annual production of undergrowth was also in the mid-range of all stands, averaging 910 lb/acre (1,020 kg/ha). This was highly variable between stands, ranging from a low of 501 to a high of 1,539 lb/acre (562 to 1,725 kg/ha). Over three-fourths of this production was forbs at 46 percent and graminoids at 31 percent. The remaining 23 percent was the annual growth of shrubs. The undergrowth is in the mid-range of suitability as summer range for livestock, with an average 56 percent classified as desirable and 35 percent as intermediate. The large amount of structural diversity in the mixed aspen-conifer tree layer combined with a mixture of shrubs, forbs, and graminoids in the undergrowth suggest that this type has fairly high value as wildlife habitat.

**Other**—In the Utah classification (Mueggler and Campbell 1986), seral communities of this composition were classified as the *P. tremuloides—A. lasiocarpa / S. oreophilus/S. serra* c.t. Some of the communities falling in the *P. tremuloides—A. lasiocarpa / S. oreophilus* c.t. of the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982) are contained in this type.

## *Populus tremuloides—Abies lasiocarpa/Thalictrum fendleri* Community Type (POTR-ABLA/THFE c.t.)

**Distribution**—The POTR-ABLA/THFE c.t. is a minor community type that is widely distributed throughout the Region but is most prevalent in the northern part. The type accounts for 4 percent of the aspen stands on the Brider-Teton National Forest in Wyoming and 3 percent on the Wasatch-Cache and Manti-LaSal National Forests in Utah. The type was observed as far south as the Markagunt Plateau in southern Utah. It also occurs in the Jarbidge and Schell Creek Ranges in Nevada. This is a moderately high elevation type with 90 percent of the stands above 7,000 ft (2,100 m). The type occurred as high as 10,100 ft (3,080 m) on the Manti-LaSal. The type occupies slopes of all exposures and steepness but usually at the mid-slope position. Two-thirds of the stands occupy soils of sedimentary parent rock, primarily sandstones.

**Vegetation**—The POTR-ABLA/THFE c.t. is characterized by a tree layer in which *Abies lasiocarpa* or *Picea engelmannii* or both are prominent along with *Populus tremuloides* and by a relatively simple undergrowth consisting primarily of low-growing forbs. The prominence of conifers in the tree layer may take the form of reproduction that has not yet reached the height of the tree canopy, which is dominated by *P. tremuloides*. Although a shrub stratum per se is absent, minor amounts of shrubs are frequently present. The most common of these are *Symphoricarpos oreophilus, Pachystima myrsinites*, and *Berberis repens*. The undergrowth is dominated primarily by such forbs as *Thalictrum fendleri, Osmorhiza chilensis*, and *Geranium viscosissimum*. Less common, but at times relatively abundant when present, are *Lathyrus* spp., *Lupinus argenteus, Arnica cordifolia, Stellaria jamesiana*, and *Fragaria vesca*. The most common graminoids in this type are *Agropyron trachycaulum, Carex rossii*, and *Bromus carinatus*, but they are seldom abundant. Annual species are rather scarce.

**Succession**—Given time, the normal course of succession is toward dominance of the tree stratum by *A. lasiocarpa*. Thus, the POTR-ABLA/THFE c.t. is a seral type within the *A. lasiocarpa* climax forest series. Comparisons of constancy of important species suggest that it is most likely a seral stage within the *A. lasiocarpa / O. chilensis* habitat type (Mauk and Henderson 1984; Steele and others 1983). The effects of heavy grazing could cause an increase in such herbaceous species as *A. cordifolia, S. jamesiana, F. vesca, Poa pratensis*, and *Taraxacum officinale* at the expense of the more palatable or less grazing-resistant herbs.

**Production**—Although total tree basal area ranked in the upper quarter of all stands sampled, 205 ft$^2$/acre (47.0 m$^2$/ha), the type was only moderately good for the production of aspen. Aspen site index at 80 years averaged 49 ft (15 m), and wood volume production at stand maturity was estimated at 38 ft$^3$/acre/year (2.7 m$^3$/ha/year), both of which were in the mid-third percentile of all stands. Aspen reproduction was a moderate 1,196 suckers/acre (2,855/ha), as was total tree density at 647 stems/acre (1,598/ha). Although the normal course of succession will eventually take this type to dominance by conifers, the type does have the potential to be at least moderately productive of aspen wood fiber in the interim.

However, the potential of the type as a long-term forage resource appears to be low. Annual production of undergrowth was highly variable but averaged a meager 496 lb/acre (556 kg/ha) of air-dry herbage. This ranked in the low quarter of all stands, and is probably attributable in great part to the relative abundance of conifers (over a fourth of the tree basal area). Of the undergrowth production, 86 percent was forbs, with only 13 percent graminoids and 1 percent shrubs. This mixture is of only average suitability as livestock forage, with 47 percent in the desirable category and 45 percent intermediate. The type is thus poor summer range for livestock primarily because of meager forage production. Although the mixture of aspen and conifers in the tree stratum undoubtedly enhances the value of the type as wildlife habitat, lack of diversity in undergrowth vegetation classes makes the type of limited value as wildlife habitat.

**Other**—The POTR-ABLA/THFE c.t. was identified by this name in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982). However, in the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981), communities of this general composition were included as part of the *P. tremuloides—A. lasiocarpa/A. cordifolia* and the *P. tremuloides—A. lasiocarpa/B. repens* types. Although aspen communities seral to *A. lasiocarpa* are common in Colorado (Johnston and Hendzel 1985), communities with this general composition have not been specifically identified there.

## *Populus tremuloides—Pinus contorta/ Juniperus communis* Community Type (POTR-PICO/JUCO c.t.)

**Distribution**—The POTR-PICO/JUCO c.t. is a local type primarily in the Uinta Mountains of northeastern Utah. It is the second most frequent type on the Ashley National Forest (8 percent of all aspen communities), and is especially abundant on the north and south slopes of the Uintas. The type occurred elsewhere in the Intermountain Region only on the Wind River and Wyoming Ranges in Wyoming and on the Wasatch Range in Utah. It was not observed farther south in Utah nor was it seen in Nevada. This is a fairly high elevation type. Over 90 percent of the stands were at elevations over 8,000 ft (2,400 m). These usually occurred on less than 25 percent slopes and on all exposures. They were confined primarily to soils derived from sandstone and quartzite parent rock.

**Vegetation**—This seral community type is characterized by the prominence of *Pinus contorta* associated with *Populus tremuloides* in the tree layer and a shrub layer dominated by *Juniperus communis*. Except for the mixed aspen and conifer tree stratum, the structure of the type is fairly simple with only moderate species diversity. Other shrubs commonly associated with *J. communis* in the undergrowth are *Berberis repens*, *Arctostaphylos uva-ursi*, and *Symphoricarpos oreophilus*. This shrub layer is generally broken and patchy. The herbaceous stratum is a composite of graminoids and low-growing forbs. The most common and abundant graminoids are *Carex geyeri*, *Stipa occidentalis*, and *Agropyron trachycaulum*. *Astragalus miser* was fairly abundant in two-thirds of the 23 stands sampled. Other common forbs are *Achillea millefolium*, *Geranium viscosissimum*, *Thalictrum fendleri*, *Lupinus argenteus*, and *Taraxacum officinale*. Annuals are scarce.

**Succession**—The prominence of *P. contorta*, and in some instances *Abies lasiocarpa* or *Pseudotsuga menziesii*, in these communities indicates that the tree overstory will gradually convert to conifer dominance. Thus, the aspen in these stands is considered to be seral. In most cases, the *P. contorta* is likely a seral species as well. The end point in the successional process, then, would probably be either climax communities in the *A. lasiocarpa* forest series or possibly in the *P. menziesii* forest series. The type is most similar in composition to the *P. contorta/B. repens* c.t. that Mauk and Henderson (1984) suggest may be a seral stage within the *A. lasiocarpa/B. repens* habitat type. Grazing by livestock has undoubtedly changed the composition of the undergrowth, but the magnitude of these changes is difficult to ascertain. The flora probably was once more diverse and possibly more productive than it is now.

**Production**—This seral type was not sampled to obtain estimates of overall productivity. The type is, however, structurally and compositionally similar to the *P. tremuloides—A. lasiocarpa/J. communis* c.t., except for the tree stratum. Tree productivity for this latter type suggests that the POTR-PICO/JUCO c.t. is probably in the mid-range for all aspen types, with total tree basal areas averaging about 150 $ft^2$/acre (34.4 $m^2$/ha), aspen site index of about 55 ft (16.8 m), and volume production of approximately 45 $ft^3$/acre/year (3.2 $m^3$/ha/year). Annual production of undergrowth probably averages in the lower quarter of all stands, principally because of shading by conifers in the tree layer. Undergrowth is about 200 to 500 lb/acre (224 to 560 kg/ha) of air-dry material. This undergrowth is believed to be only moderately suitable as livestock forage. Thus, the type is considered moderately productive of wood fiber and rather poor summer range for livestock. The value of the type as wildlife habitat appears to be poor because of the lack of undergrowth production.

**Other**—The Utah classification (Mueggler and Campbell 1986) recognized these communities under the same type name.

## *Populus tremuloides—Abies concolor/ Symphoricarpos oreophilus* Community Type (POTR-ABCO/SYOR c.t.)

**Distribution**—This is a minor seral type that occurs primarily in central Utah and east-central Nevada. It is fairly abundant on the Manti-LaSal and the Fishlake National Forests where it accounts for 5 and 6 percent of the aspen communities, respectively. The center of the type appears to be the Wasatch Plateau. It occurs as far north as the Wasatch Range in northern Utah and as far south as the Markagunt and Aquarius Plateaus on the Dixie National Forest, and was found in Nevada only in the Snake and Schell Creek Ranges of the Humboldt National Forest. The POTR-ABCO/SYOR c.t. is an intermediate elevation type with 95 percent of the stands growing between 7,000 and 9,000 ft (2,100 and 2,700 m). These stands were on less than 40 percent slopes, on all exposures, and on soils derived from both igneous and sedimentary parent rock.

**Vegetation**—The vegetation is characterized by the prominence of *Abies concolor* and virtual absence of *Abies lasiocarpa* in the tree layer, with undergrowth consisting

Figure 27—The *Populus tremuloides—Abies concolor/Symphoricarpos oreophilus* c.t. is a minor seral type that occurs primarily in central Utah and east-central Nevada. The presence of conifer reproduction indicates that the overstory in this type will eventually be dominated by *A. concolor*.

of a low shrub stratum and a mixed herb stratum of grasses and low forbs. The typifying and prominent shrub is *Symphoricarpos oreophilus*, with *Rosa woodsii* and *Berberis repens* also fairly common. A wide mixture of forbs and graminoids can be present, but no one species has high constancy. The most common graminoids are *Agropyron trachycaulum*, which occurred in about half of the 32 stands, and *Bromus carinatus* and *Stipa occidentalis*, which were present in about a third of the stands. The most common forbs are *Osmorhiza chilensis* and *Stellaria jamesiana*, in about two-thirds of the stands, and *Achillea millefolium*, *Thalictrum fendleri*, and *Taraxacum officinale*, in less than half the stands. Tall forbs such as *Aster engelmannii*, *Agastache urticifolia*, *Mertensia arizonica*, *Senecio serra*, and *Rudbeckia occidentalis* were occasionally conspicuous. Annuals were seldom prominent.

**Succession**—Given time and freedom from disturbance, stands within the POTR-ABCO/SYOR c.t. will eventually succeed to dominance by *A. concolor* (fig. 27). Judging from comparisons of species constancies (appendix E), the type is most likely a seral stage within the *A. concolor / B. repens* habitat type. Livestock grazing has had considerable impact on some stands as suggested by the presence of, but lack in abundance of, such tall forbs as *A. engelmannii*, *A. urticifolia*, *Hackelia floribunda*, *S. serra*, and *M. arizonica*, and the relative abundance of less palatable species. Under heavy cattle grazing, an increase in *R. occidentalis* and possibly *Lathyrus* spp. can be expected at the expense of the more palatable grasses and forbs. Heavy sheep use is expected to suppress *S. oreophilus* as well as the palatable tall forbs, and the production of grasses should be enhanced.

**Production**—Tree basal area ranked in the upper quarter of all aspen stands. The four stands sampled for production averaged 199 $ft^2$/acre (45.6 $m^2$/ha). An average 62 percent of this was aspen and the remainder was conifers. The growth rate of aspen, however, appears to be low. Aspen site index at 80 years averaged only 37 ft (11.2 m), and estimated aspen volume growth at stand maturity averaged only 22 $ft^3$/acre/year (1.5 $m^3$/ha/year). Both of these growth measurements were in the lower quarter percentile of all stands. Tree density was better than average at 938 stems/acre (2,317/ha), but aspen reproduction was a low 113 suckers/acre (279/ha). Therefore, the type does not appear particularly well suited for the production of aspen wood fiber even though it is able to support substantial tree basal area.

Undergrowth production was also meager, averaging only 310 lb/acre (348 kg/ha). This was in the lowest tenth percentile of all aspen stands and is probably caused largely by the relative abundance of conifers in the tree layer which intensifies shading of the undergrowth. Shrubs were 50 percent of this undergrowth, forbs 49 percent, and graminoids only 1 percent. The undergrowth appears about average in value as forage, with 55 percent of the cover ranking as desirable and 41 percent as intermediate. The type is poor summer range for livestock, especially cattle, because of the low overall productivity and lack of graminoids. The mixture of aspen and conifers in the overstory plus the large proportion of shrubs in the undergrowth suggest that the type is fair to good habitat for wildlife.

**Other**—The Utah classification (Mueggler and Campbell 1986) treats communities of this composition and structure under the same type name.

## INCIDENTAL ASPEN COMMUNITY TYPES

### *Populus tremuloides/Veratrum californicum* Community Type (POTR/VECA c.t.)

**Distribution**—This scarce yet identifiably unique community type is described on the basis of seven stands in Utah and Nevada. In Utah, one of these stands was on the northwest slope of the Uinta Mountains in the upper Bear River drainage, one was just east of Salt Lake City in the Wasatch Range, and one was in the San Pitch Mountains east of Santaquin. In Nevada, the type was observed in the Santa Rosa, Independence, and Jarbidge Ranges of the Humboldt National Forest in the northern part of the State. Most of these stands were at elevations between 7,000 and 8,000 ft (2,100 and 2,400 m). They grew on gently sloping, concave land surfaces that were usually very moist sites with relatively poor drainage and deep, heavy soils.

**Vegetation**—The vegetation of the POTR/VECA c.t. is characterized by the prominence of the conspicuously tall and coarsely robust forb, *Veratrum californicum* (fig. 28). Conifers are seldom present and never prominent. Shrubs also are never prominent, although such species as *Salix scouleriana*, *Rosa woodsii*, and especially *Symphoricarpos oreophilus* may be present in small quantities. The tall forb *Mertensia arizonica* is an important associate in almost three-fourths of the stands, and the low forb *Stellaria jamesiana* was readily apparent in most of the stands. Other forbs frequently encountered in this type are *Valeriana occidentalis, Hackelia floribunda*, and *Rudbeckia occidentalis*. *Senecio serra* is occasionally abundant. Graminoids are seldom abundant. The most frequent ones, are *Bromus carinatus*, *Agropyron trachycaulum*, and *Carex hoodii*. Annuals, especially *Nemophila breviflora*, are frequently abundant.

**Succession**—This relatively rare type appears to be stable in a specialized habitat that is very moist, particularly early in the growing season. The soil remains saturated with water for an extended period following snow-melt because of runoff and subsurface seepage from up-slope areas. *Veratrum californicum* appears well adapted to these sites, but the persistence of aspen is somewhat questionable. Aspen reproduction does not appear to do well if the site remains wet for too long, as evidenced by dense *V. californicum* stands lacking aspen adjacent to less dense stands of *V. californicum* with an aspen overstory. Heavy, prolonged grazing discourages the relatively few palatable graminoids and forbs and promotes the dominance of *V. californicum* and annuals.

**Production**—The single stand sampled for productivity suggests that although tree basal area may be low, aspen growth is rapid. Tree basal area was 71 $ft^2$/acre (16.4 $m^2$/ha) and aspen site index at 80 years was 67 ft (20.4 m). Aspen volume growth at stand maturity was estimated as 61 $ft^3$/acre/year (4.3 $m^3$/ha/year). Both these productivity measurements are in the upper tenth of all aspen stands sampled for production in the Region. Aspen reproduction in this one stand was good at 1,583 suckers/acre (5,732/ha), but tree density was low at 400 stems/acre (988/ha), which reflects the low stand basal area.

Undergrowth production can be high because lack of soil moisture seldom restricts plant growth. The sampled

Figure 28—The *Populus tremuloides/Veratrum californicum* c.t. is an infrequent but vegetationally distinct type encountered in both Utah and Nevada. The robust undergrowth dominant, *V. californicum*, is indicative of moist, poorly drained site conditions.

stand produced 1,583 lb/acre (1,775 kg/ha), which was in the upper quarter percentile of all stands. Forbs accounted for 34 percent of this production, graminoids 65 percent, and the remaining 1 percent was shrubs. This ratio of forbs to graminoids is somewhat atypical for this type. The proportion of forbs is generally much greater than that of graminoids because of the usual abundance of the robust forb *V. californicum*. Because of species composition, the type is poor for livestock grazing, despite the abundance of undergrowth. Only 56 percent of the vegetation cover was classified as desirable and intermediate forage. This can be misleading when applied to all stands within the type because *V. californicum* has the potential to exclusively dominate the undergrowth on some sites. When this occurs, the lush undergrowth has little value as livestock forage. Lack of structural and species diversity limits the value of this type as wildlife habitat.

**Other**—Aspen communities similar to this were recognized under this name in the Utah classification (Mueggler and Campbell 1986). Although the type is scarce, it appears to be fairly widespread. Hoffman and Alexander (1980) described a *P. tremuloides / Veratrum tenuipetalum* habitat type on the Routt National Forest in northwestern Colorado, and Johnston and Hendzel (1985) described a climax aspen type with this name on the San Juan National Forest in southern Colorado. According to Harrington (1954), *V. tenuipetalum* and *V. californicum* are synonymous.

Johnston and Hendzel (1985) mentioned that snow damage to aspen suckers in this type can be great, especially in clearcuts. They also observed that all of the aspen suckers (5 years old) in one such stand were killed by an unknown disease, and they speculated that the disease might be related in some way to the characteristic saturated soils of the type.

## *Populus tremuloides/Rubus parviflorus* Community Type (POTR/RUPA c.t.)

**Distribution**—Only four stands within this community type were encountered, each on a different National Forest in the northern part of the Region. One was in the Wind River Range of the Bridger-Teton, one in the Webster Range of the Caribou, one in the Wasatch Range of the Wasatch-Cache, and one at the west end of the Uinta Mountains on the Uinta National Forest. All were observed at fairly high elevations for this far north, between 8,000 and 9,300 ft (2,400 and 2,800 m). All occupied either mid or upper slope positions of fairly steep slopes, ranging from 26 to 65 percent. They did not appear to be otherwise confined by either exposure or soil parent material.

**Vegetation**—This low shrub undergrowth type is characterized by the overwhelming prominence and dominance of the broad-leaved shrub *Rubus parviflorus* beneath the *Populus tremuloides* tree layer. Although conifers such as *Pinus contorta, Abies lasiocarpa*, and *Pseudotsuga menziesii* may occasionally be present, they do not form a prominent part of the tree stratum. Shrubs that frequently accompany *R. parviflorus* are *Pachystima myrsinites, Shepherdia canadensis*, and to a lesser extent *Symphoricarpos oreophilus* and *Rosa woodsii*. The herbaceous undergrowth consists primarily of low-growing forbs such as *Arnica cordifolia, Geranium viscosissimum, Castilleja linariaefolia*, and *Osmorhiza chilensis*. Sometimes *Lathyrus* spp. and *Vicia americana* are abundant. Of a wide variety of graminoids that may be present, the most common are *Elymus glaucus* and *Agropyron trachycaulum*. *Calamagrostis rubescens* and *Carex geyeri* are abundant in some stands. Annuals are usually scarce.

**Succession**—The successional status of this minor type is unclear. It could remain dominated by *P. tremuloides* over an extended period or, judging from the presence of some conifers, the type could slowly convert to dominance by either *A. lasiocarpa* or perhaps *P. menziesii*. Too little data are available to guess at the eventual habitat type. In any case, *R. parviflorus* will probably remain a prominent part of the undergrowth. Heavy grazing by sheep will probably reduce the abundance of *R. parviflorus*.

**Production**—The single stand sampled for production had a low stand basal area of 74 $ft^2$/acre (17.0 $m^2$/ha), but the growth of aspen was good, ranking in the upper 10 percent of all stands. Site index of aspen at 80 years was 65 ft (19.9 m), and estimated volume production at stand maturity was 60 $ft^3$/acre/year (4.2 $m^3$/ha/year). Both aspen reproduction and tree density ranked in the lower quarter of all stands at 219 suckers/acre (541/ha) and 348 stems/acre (860/ha), respectively. Therefore, although both stand density and basal area were low in this type, the potential of the type for the rapid growth of aspen appears to be high.

The annual production of undergrowth was a low 513 lb/acre (575 kg/ha), which ranked in the lower quarter of all stands. By far the bulk of this annual growth was of shrubs, primarily *R. parviflorus*. Forbs were only 10 percent and graminoids only 3 percent of this undergrowth. The type thus appears to provide comparatively poor summer range for livestock. The value as wildlife habitat is only moderate.

**Other**—Although aspen communities of this composition were observed in earlier classifications, they were so infrequent that they were not treated as a separate community type. However, they are recognized as a separate type in this classification because, even though rare, they occur over a rather broad extent of the northern part of the Region.

## *Populus tremuloides/Sambucus racemosa* Community Type (POTR/SARA c.t.)

**Distribution**—This incidental community type was observed primarily in central Utah. The type was centered on the Wasatch Plateau on the Manti-LaSal National Forest, but was encountered as far north as the Bear River Range on the Wasatch-Cache National Forest and as far south as the Abajo Mountains in southeastern Utah. It was not seen in Idaho, Wyoming, or Nevada. It is a fairly high elevation type. All but one of the 11 stands sampled were above 8,000 ft (2,400 m), and one was at 10,500 ft (3,200 m). The type occurred most frequently at mid to upper positions of moderate to steep slopes. Soil parent rock varied, but almost half was limestone.

**Vegetation**—The conspicuous feature of this type is the prominence of the shrubs *Sambucus racemosa* or *S. cerulea* in the undergrowth (fig. 29); with the exception of *Symphoricarpos oreophilus*, other shrubs are usually scarce. The tree overstory usually consists exclusively of *Populus tremuloides*. Occasionally, *Abies lasiocarpa* may be present, but it is never abundant. The herbaceous stratum generally has a large and variable component of such tall forbs as *Polemonium foliosissimum*, *Osmorhiza occidentalis*, *Mertensia arizonica*, *Delphinium occidentale*, *Valeriana occidentalis*, *Rudbeckia occidentalis*, *Agastache urticifolia*, and *Senecio serra*. The most frequent and abundant low-growing forbs in this type are *Thalictrum fendleri* and *Stellaria jamesiana*. The graminoid component of the undergrowth is usually dominated by *Bromus carinatus*. *Agropyron trachycaulum* and *Elymus glaucus* are frequent associates. Annuals are often abundant because of soil disturbance by pocket gophers. The most common annual plants are *Galium bifolium*, *Descurainia richardsonii*, *Polygonum douglasii*, *Collomia linearis*, and *Nemophila breviflora*.

**Succession**—Some of the communities in this type are stable, but others may gradually succeed to overstory dominance by *A. lasiocarpa*. Heavy prolonged grazing by livestock will no doubt alter the undergrowth composition appreciably. If grazed by sheep, the shrubs and tall forbs are likely to suffer, while the graminoids and annuals increase in abundance. Heavy grazing by cattle would probably reduce the abundance of some of the more palatable grasses, especially *B. carinatus*, the shrubby *Sambucus* spp., and some of the tall forbs. In this case, *R. occidentalis*, *S. serra*, and the low forbs and annuals should increase in abundance.

**Production**—The POTR/SARA c.t. is moderately productive of trees, with total tree basal area in the six stands sampled for production averaging 137 ft$^2$/acre (31.3 m$^2$/ha). Site index for aspen at 80 years averaged 50 ft (15.2 m), and estimated aspen volume production at maturity averaged 39 ft$^3$/acre/year (2.7 m$^3$/ha/year). All of these tree productivity measurements are in the upper third percentile of all stands sampled for production. Both tree density and aspen reproduction were about normal for aspen stands in the Region, averaging 556 stems/acre (1,374/ha) and 696 suckers/acre (1,720/ha). The type is somewhat better than average for the production of wood fiber.

The undergrowth generally consists of a more productive than average mixture of grasses, forbs, and shrubs. Annual production of air-dry herbage averaged 1,130 lb/acre (1,267 kg/ha), which is in the upper third of all stands. Forbs were 45 percent of this production, graminoids 35 percent, and shrubs 20 percent. This undergrowth was also above average in its suitability as livestock forage, with 48 percent classified as desirable and 46 percent as intermediate. The type thus is both good summer range for livestock and good habitat for wildlife.

**Other**—Aspen communities of this composition and structure were named the same in the earlier Utah aspen

Figure 29—The *Populus tremuloides/Sambucus racemosa* c.t. is an infrequent, stable aspen type observed most often in central Utah. The principal distinguishing feature is the prominence of the shrubs *S. racemosa* or *S. cerulea* under an aspen overstory.

classification (Mueggler and Campbell 1986). This type has not been reported to occur outside of the Intermountain Region.

## *Populus tremuloides/Salix scouleriana* Community Type (POTR/SASC c.t.)

**Distribution**—The POTR/SASC c.t. appears to be restricted to the northern half of the Region. It occurred on the Yellowstone Plateau in eastern Idaho, on the Bear River and Wasatch Ranges in northern Utah, and in the mountains of northeastern Nevada. Although the type is seldom encountered elsewhere, it is most common in northeastern Nevada where it comprises 3 percent of the aspen communities on the Humboldt National Forest. It is a comparatively low elevation type. The 13 stands examined were at elevations ranging from 5,800 to 7,400 ft (1,800 to 2,300 m). The majority of these stands occupied mid-slope positions on moderately steep north- and east-facing slopes. They occurred on soils derived from a broad range of parent materials.

**Vegetation**—The primary distinguishing feature of this type is the prominence of *Salix scouleriana* in a tall shrub stratum below the *Populus tremuloides* overstory. No conifers were observed in any of the stands. The shrub stratum is variable but at times can be fairly dense with considerable amounts of *Amelanchier alnifolia* or *Prunus virginiana* associated with the *S. scouleriana*. Low shrubs are also frequently present, particularly *Symphoricarpos oreophilus* and *Rosa woodsii*. The herbaceous stratum usually consists of a mixture of graminoids, tall forbs, low forbs, and annuals. Low forbs usually predominate, especially *Osmorhiza chilensis* and *Thalictrum fendleri*. The most frequently encountered tall forbs are *Agastache urticifolia*, *Senecio serra*, and *Hackelia floribunda*. *Epilobium angustifolium* was more common in this type than in most of the other community types. Common grasses are *Elymus glaucus* and *Bromus carinatus*. Annuals were abundant in some of the stands, particularly *Nemophila breviflora* and *Galium bifolium*.

**Succession**—Although no evidence showed that stands within this type will succeed to conifer dominance, the sites appear moist enough to support conifers. Even though the type may appear relatively stable, the long-term successional status is thus obscure. The continued presence of *S. scouleriana* in the shrub stratum over an extended period is questionable. Both *S. scouleriana* and *E. angustifolium* are species that establish especially well from seed following fire. Whether these two species will be able to regenerate in these stands without this type of disturbance is uncertain. Where *Salix* decreases in abundance with time, a stand in this type would eventually be categorized in either the POTR/AMAL/THFE c.t. or POTR/AMAL/TALL FORB c.t.

**Production**—No stands in the POTR/SASC c.t. were sampled for production. Judging from stand structure, species composition, and field observations, the type makes wildlife habitat. The abundance of tall and low-growing shrubs provides not only ample browse but excellent hiding cover as well. Suitability as livestock range appears to be only moderate because the dense shrubby undergrowth tends to hamper livestock movement. The potential for the production of wood fiber is unknown and probably unimportant because the type does not occur in any abundance.

**Other**—This community type has not been described previously.

## *Populus tremuloides/Pteridium aquilinum* Community Type (POTR/PTAQ c.t.)

**Distribution**—This unusual and distinct type was observed on three National Forests within the Region: Wasatch-Cache, Uinta, and Dixie. The principal location of the 13 stands sampled was the Wasatch Range between Salt Lake City and Heber City, UT. One stand was seen as far south as the Markagunt Plateau in southern Utah. The stands in northern Utah were at elevations between 5,800 and 8,400 ft (1,800 and 2,600 m). The stand in southern Utah was at 9,350 ft (2,850 m). The type generally occupied mid-slope positions of moderate to steep slopes, two-thirds of which were of easterly exposure. Most of these stands occupied soils of sandstone parent rock, but some were found on granitics.

**Vegetation**—The vegetation differs from the somewhat similar *Populus tremuloides/Amelanchier alnifolia/Pteridium aquilinum* c.t. by the lack in abundance of shrubs. Such shrubs as *Symphoricarpos oreophilus* or *Sambucus racemosa* may occasionally be present, but they are not prominent. The tree stratum usually is exclusively *P. tremuloides*. Conifers are seldom present and then only in incidental amounts. The predominantly herbaceous undergrowth is overwhelmingly dominated by the distinctive fern, *Pteridium aquilinum* (fig. 30). This is frequently accompanied by such tall-growing forbs as *Rudbeckia occidentalis*, *Agastache urticifolia*, *Aster engelmannii*, and *Senecio serra* . The most common low forbs are *Osmorhiza chilensis* and *Thalictum fendleri*. Graminoids such as *Elymus glaucus* and *Bromus carinatus* are usually intermixed with these forbs. Annuals can be abundant.

**Succession**—The lack of conifers suggests that the overstory will remain dominated by aspen. However, the successional status of the undergrowth is uncertain. *Pteridium aquilinum* is a native species distributed sporadically throughout the West. Where it does occur, it is usually a dominant part of the undergrowth. Thus, it may indicate a specific site situation, and such stands may represent more or less stable conditions or climax community types. On the other hand, *P. aquilinum* is not only unpalatable to livestock and reproduces readily by creeping rhizomes, but it appears to be allelopathic. Overgrazing that inhibits the growth of palatable forage species would encourage the growth and reproduction of *P. aquilinum*. Judging from undergrowth composition, then, this type might also represent a grazing-degraded

Figure 30—The distinctive *Populus tremuloides/Pteridium aquilinum* c.t., though seldom encountered, is widespread in both the Intermountain and Rocky Mountain Regions. The predominantly herbaceous undergrowth is overwhelmingly dominated by the fern *P. aquilinum.*

seral stage of a POTR/TALL FORB climax community type. In either event, abusive grazing will tend to encourage dominance of *P. aquilinum* and *R. occidentalis* at the expense of such forage species as *B. carinatus*, *E. glaucus*, *A. engelmannii*, and *A. urticifolia*.

**Production**—Five stands were sampled in the POTR/PTAQ c.t. to obtain an estimate of productivity. The potential of the type for the production of trees is considerably above average. Although total stand basal area averaged only a moderate 146 $ft^2$/acre (33.6 $m^2$/ha), average site index for aspen, 57 ft (17.5 m), and volume growth for aspen at stand maturity, 49 $ft^3$/acre/year (3.4 $m^3$/ha/year), were in the upper quarter of all stands sampled in the Region. Average density of trees, 1,108 stems/acre (2,737/ha) and aspen reproduction, 7,658 suckers/acre (18,924/ha), were also in the upper quarter percentile. Thus, the type is very productive of wood fiber.

Although undergrowth production is generally high in this type, it is of relatively low value as livestock forage. Annual growth of herbaceous material averaged 1,571 lb/acre (1,762 kg/ha), which is in the upper quarter of all stands. Over 90 percent of this was forbs, primarily the unpalatable *P. aquilinum*. Of the total undergrowth cover 51 percent was in the least desirable forage suitability class. The type also has fairly low value as wildlife habitat because of its lack of structural diversity and low abundance of palatable species.

**Other**—This type was recognized by this name in the Utah aspen classification (Mueggler and Campbell 1986). It also occurs in Colorado and is identified as the *P. tremuloides / P. aquilinum* habitat type by Hoffman and Alexander (1980, 1983). The main difference in the Colorado communities is the occurrence of substantial amounts of *Carex geyeri* in most stands.

## *Populus tremuloides/Amelanchier alnifolia/Pteridium aquilinum* Community Type (POTR/AMAL/PTAQ c.t.)

**Distribution**—Except for a single stand in the Pine Valley mountains of the Dixie National Forest in southwestern Utah, this minor but unique community type appears to be confined primarily to the northern part of Utah, especially along the Wasatch Range, and with an additional example on the south slope of the Uinta Mountains. The type was not encountered in Idaho, Wyoming, or Nevada. Most of the 10 stands examined were growing at elevations below 7,000 ft (2,100 m). The sites were primarily northerly and easterly exposures, tending toward the lower slope positions, and mostly on soils derived from sandstones.

**Vegetation**—The POTR/AMAL/PTAQ c.t. is differentiated from the POTR/PTAQ c.t. by the relative abundance of tall shrubs in the undergrowth. The tree layer is almost exclusively *Populus tremuloides*. *Abies concolor* or *A. lasiocarpa* may be present in the tree layer or as reproduction but not in such abundance as to suggest eventual replacement of aspen dominance in the overstory. The tall shrub stratum is dominated either by *Acer grandidentatum*, *Prunus virginiana*, *Amelanchier alnifolia*, or a combination. Low shrubs, usually *Symphoricarpos* *oreophilus*, *Rosa woodsii*, or *Berberis repens*, are also frequently present, sometimes in substantial amounts. The most distinctive feature is the abundance of *Pteridium aquilinum* in the herbaceous undergrowth. This fern usually dominates the herb layer but is frequently accompanied by members of the tall forb group. Low forbs, usually *Osmorhiza chilensis*, *Smilacina stellata*, and *Galium borealis*, and grasses such as *Elymus glaucus* and *Bromus carinatus* are generally a conspicuous part of the herb layer. Annual plants are often fairly abundant.

**Succession**—The lack of conifers suggests that this is a stable aspen type. However, the successional status of the undergrowth is uncertain. The type may be a grazing-degraded form of the POTR/AMAL/TALL FORB c.t., with which it has many species in common. *Pteridium aquilinum* is not only unpalatable to livestock, it can be poisonous to cattle when eaten in quantity. This unpalatability combined with its ability to spread by creeping rhizomes suggests that it is likely to increase greatly in abundance if its palatable associates are depleted by prolonged excessive grazing. On the other hand, seldom if ever does *P. aquilinum* occur as a minor member of a community. It either tends to dominate the undergrowth or it is absent. This restricted distribution combined with abundance where it does occur suggests that it may have rather specific, and as yet undefined, environmental requirements and represents a distinct climax community type.

**Production**—Five stands were sampled to determine productivity. The type is similar to the POTR/PTAQ c.t. in that, although total tree basal area was a moderate 136 $ft^2$/acre (31.2 $m^2$/ha), both aspen site index at 80 years, 57 ft (17.3 m), and estimated aspen volume growth at stand maturity, 48 $ft^3$/acre/year (3.4 $m^3$/ha/year), were in the upper quarter of all stands. Although aspen reproduction averaged a high 1,897 suckers/acre (4,688/ha), tree density was only moderate at 833 stems/acre (2,058/ha). The potential for the production of wood fiber, then, was well above average for all aspen stands.

The potential for undergrowth production was high, averaging 2,070 lb/acre (2,320 kg/ha), which was in the upper tenth percentile of all stands. This varied greatly between stands, ranging between 837 and 3,796 lb/acre (938 and 4,256 kg/ha). One stand produced the greatest amount of undergrowth measured in this study. The bulk of the undergrowth consisted of forbs, 87 percent, most of which was the unpalatable *P. aquilinum*. Overall suitability of the undergrowth as livestock forage was low; 36 percent of the cover was classified as desirable, 30 percent as intermediate, and a very high 34 percent as least desirable. Although this type may have considerable wildlife habitat benefits because of its multilayered cover of trees, tall shrubs, and herbs, livestock grazing values are poor to moderate because of the amount of unpalatable species.

**Other**—This type was previously identified in the Utah classification as the *P. tremuloides / A. grandidentatum / P. aquilinum* c.t. (Mueggler and Campbell 1986). Aspen communities containing an abundance of *P. aquilinum* in the undergrowth have also been identified in northwestern Colorado on the west slope of the Park Range by Bunin (1975) and on the White River National Forest by Hoffman and Alexander (1980). Neither of these reports indicated the presence of a tall shrub stratum. Hoffman and Alexander (1980), however, do describe a *P. tremuloides / P. aquilinum* habitat type for the Routt National Forest in which almost half of the stands contain a tall shrub stratum of *A. alnifolia* or *P. virginiana* or both, a low shrub layer, and an herb layer containing species typical of our POTR/AMAL/PTAQ c.t. The most conspicuous difference was the abundance of *Carex geyeri* in their stands and absence of this sedge in ours.

## *Populus tremuloides/Festuca thurberi* Community Type (POTR/FETH c.t.)

**Distribution**—Although this is an incidental type Region-wide, it is important locally in southern Utah. The POTR/FETH c.t. accounts for 8 percent of the aspen communities on the Dixie National Forest and 6 percent on the Fishlake National Forest. Most of the stands were observed on the Aquarius and Fishlake Plateaus. The type was not recorded for any of the other National Forests within the Region. The 18 stands examined ranged in elevation between 8,000 and 9,900 ft (2,400 and 3,000 m), which is about average for aspen communities at this latitude. The type occurred on relatively gentle slopes, less than 25 percent concave. It occupied soils derived from either volcanic or granitic parent rock.

**Vegetation**—The vegetation structure of this type is comparatively simple, consisting of a tree layer almost exclusively of *Populus tremuloides* and a predominantly herbaceous undergrowth in which the tussock grass *Festuca thurberi* is prominent (fig. 31). *Abies lasiocarpa* and *Picea engelmannii* are occasionally present either in the overstory or as reproduction, but these conifers are not a prominent part of the tree layer. Shrubs, particularly *Symphoricarpos oreophilus*, are sometimes present but never abundant. The relative lack in abundance of shrubs is what separates this type from the otherwise similar *P. tremuloides / S. oreophilus / F. thurberi* c.t. The grasses most commonly associated with *F. thurberi* in the undergrowth are *Stipa occidentalis* and *Agropyron trachycaulum*. Occasionally, *Bromus carinatus* or *Poa pratensis* may be abundant. Forbs are seldom abundant, and few have high constancy. The most common forbs are *Achillea millefolium* and *Taraxacum officinale*. In a few cases, *Lathyrus* spp. dominates the undergrowth. Ordinarily, annual plants are rather scarce.

**Succession**—The POTR/FETH c.t is basically a climax aspen type. However, the presence of conifers in some stands suggests the possibility of replacement by *A. lasiocarpa* or *P. engelmannii* if the reproduction of these trees is sufficient to occupy the site. Many of the stands have undergone considerable grazing pressure, judging from the amount of *T. officinale*, *P. pratensis*, and *Lathyrus* spp.

Figure 31—Though not encountered elsewhere in the Region, the *Populus tremuloides/Festuca thurberi* c.t. is a conspicuous type on the Fishlake and Aquarius Plateaus of southern Utah. The predominantly herbaceous undergrowth has an abundance of the distinctive and productive tussock grass *F. thurberi.*

Possibly these stands had at one time appreciably more *S. oreophilus,* which was reduced to present levels by sheep grazing. Such stands are a seral stage of a climax POTR/SYOR/FETH c.t. Heavy sheep use probably would not greatly reduce the amount of *F. thurberi,* unless such use was extreme. Heavy cattle use would tend to reduce the amount of *F. thurberi* and support an increase in *P. pratensis* and the remaining forbs.

**Production**—The POTR/FETH c.t. appears to have above-average potential for the production of trees. Total tree basal area for the six stands sampled for production averaged 224 ft²/acre (51.4 m²/ha), which is in the upper 25 percent of all aspen stands. Average site index for aspen at 80 years was 56 ft (17.0 m), and estimated volume growth at stand maturity was 47 ft³/acre/year (3.3 m³/ha/year), which is well in the upper third percentile of all stands. Aspen reproduction was moderate at 1,396 suckers/acre (3,450/ha), but tree density was well above normal at 1,074 stems/acre (2,653/ha).

Annual production of undergrowth varied greatly between stands from 289 to 3,496 lb/acre (324 to 3,919 kg/ha) and averaged a moderate 1,064 lb/acre (1,193 kg/ha). Interestingly, one stand produced close to the greatest amount of annual herbage of any aspen stand sampled, and this consisted primarily of grasses. However, average composition of the undergrowth was 56 percent graminoids, 43 percent forbs, and 1 percent shrubs. This was of about average suitability as livestock forage, with 52 percent in the desirable category and 43 percent intermediate. Considering the level of productivity and high proportion of graminoids, the type is good summer range for livestock, particularly for cattle. Lack of a shrub complex, which contributes greatly to structural diversity, limits the type's value as wildlife habitat.

**Other**—The POTR/FETH c.t. was described in the Utah classification (Mueggler and Campbell 1986) under this name. It also has been reported to occur in central and western Colorado. Hess and Alexander (1986) identified a *P. tremuloides / F. thurberi* habitat type on the Arapaho and Roosevelt National Forests and Johnston and Hendzel (1985) reported a similar type for the Gunnison and White River National Forests. According to Johnston and Hendzel, this type occurs either as islands in sagebrush or grasslands, or as small stands at the forest-grassland ecotones. They suggest that these stands will reproduce vigorously if clearcut or burned and possibly expand into surrounding grasslands or shrublands.

## *Populus tremuloides/Symphoricarpos oreophilus/Festuca thurberi* Community Type (POTR/SYOR/FETH c.t.)

**Distribution**—Distribution of this incidental type is similar to that of the POTR/FETH c.t. It was observed only on the Fishlake and Aquarius Plateaus of southern Utah. Only seven stands were sampled, all at elevations between 8,000 and 9,400 ft (2,400 and 2,900 m), about average for aspen communities in southern Utah. The stands were on gentle to moderate slopes that were generally concave. The type occurred only on soils derived from volcanic or granitic parent rock.

**Vegetation**—The primary difference between this type and the POTR/FETH c.t. is the presence of a distinct layer of low shrubs beneath the *Populus tremuloides* canopy. This shrub stratum is primarily *Symphoricarpos oreophilus* and *Rosa woodsii.* The herbaceous stratum is characterized by the conspicuous presence of the tussock grass *Festuca thurberi.* Other common grasses are *Bromus anomalus, Stipa occidentalis,* and *Agropyron trachycaulum.* Although forbs generally are not abundant, *Taraxacum officinale, Achillea millefolium,* and *Thalictrum fendleri* appear in most stands. At times, *Vicia americana* or *Lathyrus* spp. are abundant. Annuals are usually scarce.

**Succession**—The aspen overstory appears relatively stable. The few stands sampled, however, reflect what appears to be the result of considerable grazing pressure, judging from the abundance of *T. officinale, V. americana,* and *Lathyrus* spp. Heavy grazing by sheep would tend to further reduce the amount of palatable forbs and shrubs and benefit the graminoids and *T. officinale.* Heavy use by cattle would probably reduce the amount of *F. thurberi* and *B. anomalus* and tend to favor such forbs as *V. americana, Lathyrus* spp., and *T. officinale.*

**Production**—The single stand sampled for productivity suggests that it is slightly less productive than the similar POTR/FETH c.t. Stand basal area was 178 $ft^2$/acre (40.9 $m^2$/ha), aspen site index at 80 years was 49 ft (15.0 m), and aspen volume production at stand maturity was 38 $ft^3$/acre/year (2.7 $m^3$/ha/year). Tree density was a moderate 735 stems/acre (1,816/ha), but aspen reproduction was low. The wood-producing potential of the type, therefore, appears to be in the mid-range for aspen in the Region.

Undergrowth production in this single example was a modest 775 lb/acre (869 kg/ha). The main difference in undergrowth between this type and the POTR/FETH c.t. is the relative proportion of shrubs and graminoids. The abundance of graminoids, particularly *F. thurberi,* is much reduced in the POTR/SYOR/FETH c.t. and is replaced by shrubs, primarily *S. oreophilus.* The suitability of this undergrowth as forage is about average for aspen communities, with 52 percent of the cover identified as desirable and 40 percent as intermediate. The type is at least moderately good livestock summer range and better than the POTR/FETH c.t. for sheep because of the abundance of palatable shrubs. Wildlife habitat values are fairly good, a reflection of the structural diversity of the vegetation.

**Other**—This incidental type was recognized by this name in the Utah aspen classification (Mueggler and Campbell 1986). Some of the aspen communities in west-central Colorado described by Langenheim (1962) contained a low shrub stratum dominated by *S. oreophilus* and an herbaceous layer with appreciable amounts of *F. thurberi.*

## *Populus tremuloides/Symphoricarpos oreophilus/Carex rossii* Community Type (POTR/SYOR/CARO c.t.)

**Distribution**—This infrequent community type is widely scattered across the Region from as far north as the Wyoming Range on the Bridger-Teton National Forest, as far south as the Aquarius Plateau on the Dixie National Forest, and as far west as the Monitor Range on the Toiyabe National Forest. The greatest concentration is in southern Utah on the Fishlake and Dixie National Forests. Except for the high plateaus of southern Utah and the Monitor Range in central Nevada, the type is seldom encountered elsewhere in the Region. This is a fairly high elevation community type. All 18 of the stands sampled occurred over 8,500 ft (2,600 m). Most were on less than 25 percent slopes, occupied all exposures, but were restricted almost exclusively to soils derived from granitic or volcanic parent rock.

**Vegetation**—The POTR/SYOR/CARO c.t. is similar to the comparatively common POTR/CARO c.t. in that the herbaceous undergrowth is characterized by the prominence of the graminoids *Carex rossii* or *Bromus anomalus* and either the complete absence or at least lack of prominence of graminoids and forbs that serve to characterize other aspen types. It differs from the POTR/CARO c.t. by the presence of a low shrub stratum, which consists primarily of *Symphoricarpos oreophilus.* Other graminoids frequently present are *Stipa occidentalis* and *Agropyron trachycaulum.* This type does not usually have a great variety of different forbs. The most common and usually most abundant are *Lupinus argenteus* and *Taraxacum officinale.* Occasionally, *Astragalus miser* or *Arnica cordifolia* may be abundant. Annuals are generally scarce. Although the tree stratum is usually only *Populus tremuloides,* such conifers as *Pseudotsuga menziesii, Abies concolor,* or *Abies lasiocarpa* may be present in minor quantities.

**Succession**—Many of the 18 stands sampled lacked any evidence of invasion by conifers and thus should probably be considered stable aspen communities. Others appear susceptible to dominance by conifers, judging from the presence and potential increase of such species as *A. lasiocarpa* and *P. menziesii.* In such cases, the direction of succession of the POTR/SYOR/CARO c.t. would probably be toward a POTR-ABLA/CARO c.t., which appears to be a seral stage within the *A. lasiocarpa / C. rossii* habitat type described by Youngblood and Mauk (1985). Excessive grazing in the past likely contributed to the lack of species diversity in the undergrowth.

**Production**—The production potential of this type was estimated on the basis of three stands. The ability to produce trees is in the mid-range of all aspen stands, with total basal area averaging 156 $ft^2$/acre (35.8 $m^2$/ha), site index for aspen averaging 46 ft (14.0 m), and estimated volume growth of aspen at stand maturity averaging 34 $ft^3$/acre/year (2.4 $m^3$/ha/year). Tree density, however, was in the upper third percentile at 902 stems/acre (2,229/ha).

Annual production of undergrowth in the POTR/SYOR/CARO c.t. is considerably better than that in the somewhat similar major POTR/CARO c.t. This in part may be attributable to less depletion caused by past grazing. Average air-dry production was 673 lb/acre (755 kg/ha), which still is below the mid-range of all aspen stands. An average 51 percent of this undergrowth was forbs, 34 percent shrubs, and only 15 percent graminoids. The suitability of the undergrowth as livestock forage appears to be about average for aspen communities, with 51 percent rated as desirable and 44 percent as intermediate. Thus, the potential of the type is below average as livestock summer range but slightly better for sheep than for cattle because of the higher proportion of forbs and shrubs than of graminoids. Value of the type as wildlife habitat is only moderate because of the modest amount of structural diversity in the vegetation.

**Other**—Communities of this general composition were recognized in the Utah aspen classification (Mueggler and Campbell 1986), but they were considered simply a southern extension of, and included in, the *P. tremuloides / S. oreophilus / Carex geyeri* c.t. of that publication. Subsequent observations in Nevada and a reevaluation of the Utah data indicate that these communities are indeed distinct.

## *Populus tremuloides/Symphoricarpos oreophilus/Wyethia amplexicaulis* Community Type (POTR/SYOR/WYAM c.t.)

**Distribution**—The POTR/SYOR/WYAM c.t. was encountered only on the Humboldt National Forest in northeastern Nevada. This infrequent type was observed at elevations between 6,600 and 7,000 ft (2,000 and 2,100 m) on the Independence, Jarbidge, and East Humboldt mountain ranges. All these stands occupied relatively gentle 10 to 25 percent slopes of concave configuration. The type grew on soils derived from either quartzite or granitic parent rock.

**Vegetation**—The POTR/SYOR/WYAM c.t. and the more common POTR/WYAM c.t. are the only two aspen types recognized in the Intermountain Region in which the robust forb *Wyethia amplexicaulis* is a prominent part of the undergrowth. The two types are separated by the relative abundance of shrubs in the former. These shrubs contribute appreciably to the structural diversity of the type. *Symphoricarpos oreophilus* is generally the most abundant shrub, but *Amelanchier alnifolia* and *Ribes cereum* are frequently present. The herbaceous stratum usually is a greater assemblage of forbs and grasses than in the POTR/WYAM c.t. A mixture of low forbs, tall forbs, and grasses accompany the usually dominant *W. amplexicaulis*. The most commonly associated low forbs are *Geranium viscosissimum* and *Osmorhiza chilensis*. Such tall forbs as *Senecio serra, Hackelia floribunda*, and *Agastache urticifolia* are frequently present. The most common grasses are *Bromus carinatus* and *Agropyron trachycaulum*. Annual forbs, especially *Nemophila breviflora* and *Galium bifolium* are often abundant. Conifers were seldom encountered in the tree layer.

**Succession**—No evidence exists that the overstory of this type will be dominated by conifers. The undergrowth, however, is variable and subject to considerable change with grazing. The proportion of shrubs, tall forbs, and graminoids will tend to decrease under abusive livestock use, whereas *W. amplexicaulis*, other relatively unpalatable forbs, and annuals will increase in abundance. A direct negative relationship exists between the abundance of shrubs and abundance of *W. amplexicaulis*. If shrubs are abundant, ground-level shading is probably too intense to support vigorous *W. amplexicaulis*.

**Production**—None of the stands within the POTR/SYOR/WYAM c.t. were sampled for production. Judging from appearances, though, the type is more productive of trees than the somewhat similar POTR/WYAM c.t. in which aspen does not do well. The potential for wood fiber production is probably within the lower third percentile for all stands within the Region, with total basal area between 115 and 125 $ft^2$/acre (26.4 and 28.7 $m^2$/ha), aspen site index about 40 to 45 ft (12.2 to 13.7 m), and aspen volume production about 30 $ft^3$/acre/year (2.1 $m^3$/ha/year). The production of undergrowth is probably in the upper third percentile of all stands, or about 1,200 lb/acre (1,350 kg/ha). The proportion of this palatable to livestock is probably considerably higher than in the POTR/WYAM c.t. because a smaller proportion consists of the unpalatable *W. amplexicaulis* and a greater proportion in palatable shrubs, such as *S. oreophilus*, and in palatable forbs and graminoids. Wildlife habitat values are no better than moderate.

**Other**—The combination of *W. amplexicaulis* and *S. oreophilus* as undergrowth in aspen communities has not been reported previously, either within the Intermountain Region or elsewhere. *Wyethia amplexicaulis* is usually less dense and more dispersed in this type, where it is associated with *S. oreophilus*, than in the POTR/WYAM c.t.

## *Populus tremuloides/Astragalus miser* Community Type (POTR/ASMI c.t.)

**Distribution**—This incidental type is fairly widespread. It occurs on the Gros Ventre Range in western Wyoming, in the Uinta Mountains of northern Utah, and on the Fishlake, Sevier, and Aquarius Plateaus of southern Utah. The type was not seen in either Idaho or Nevada. It occurs at elevations around 7,500 ft (2,300 m) in the northern part of the Region and about 8,700 to 9,900 ft (2,650 to 3,020 m) in southern Utah. The type generally occupied moderate slopes, those below 30 percent steepness, and did not appear restricted by exposure or soil parent material.

**Vegetation**—This is a structurally simple type that consists essentially of only two strata: an overstory tree layer of *Populus tremuloides* and an undergrowth stratum comprised principally of low-growing forbs (fig. 32). Also, the undergrowth generally has low species diversity. The


Figure 32—The *Populus tremuloides/Astragalus miser* c.t. is not encountered often, but is widespread in the Intermountain Region. The undergrowth, greatly affected by intense livestock grazing and characterized by an abundance of the low-growing forb *A. miser*, has low productivity and species diversity.

herbaceous undergrowth is characterized by an abundance of *Astragalus miser*, sometimes accompanied by considerable amounts of *Lupinus argenteus*. Other forbs frequently present are *Achillea millefolium* and *Taraxacum officinale*. A variety of graminoids may be encountered, but they are seldom abundant. The most common are *Bromus ciliatus*, *Agropyron trachycaulum*, and *Carex rossii*. Shrubs also may sometimes be present but are never abundant enough to form a distinct stratum. The most commonly encountered shrubs are *Rosa woodsii*, *Juniperus communis*, and *Symphoricarpos oreophilus*. Annual plants are usually scarce. Conifers such as *Abies lasiocarpa* or *Picea engelmannii* may be present in minor amounts in the tree stratum.

**Succession**—The POTR/ASMI c.t. is believed to be a grazing-induced type, judging from the amount of *A. miser*, *T. officinale*, and *A. millefolium* in the undergrowth and the general lack of palatable forbs and graminoids. Site similarities suggest it may be a grazing-degraded version of a POTR/CARU, POTR/CARO, POTR/SYOR/CARU, or POTR/SYOR/CARO c.t. Some of the stands within this type, where invasions by conifers appear to be occurring, may eventually succeed to an *A. lasiocarpa*-dominated forest.

**Production**—Total basal area production in the POTR/ASMI c.t. averages in the upper third percentile of all stands at 148 ft$^2$/acre (34.0 m$^2$/ha), but the suitability for the growth of aspen appears to be considerably below average. For the three stands sampled for production, aspen site index at 80 years averaged only 39 ft (11.8 m), and projected volume growth at stand maturity averaged only 24 ft$^3$/acre/year (1.7 m$^3$/ha/year). These values were in the lower quarter of all stands. Aspen reproduction was moderately good at 670 suckers/acre (1,656/ha), as was tree density at 915 stems/acre (2,261/ha). The type thus appears to have a below-average potential for the production of wood fiber.

Total production of undergrowth was poor, averaging only 395 lb/acre (443 kg/ha), which was in the lower quarter percentile of all stands. Most of this undergrowth was forbs, 74 percent, with 15 percent graminoids, and 11 percent shrubs. The suitability of the undergrowth as livestock forage was also poor, with only 26 percent classified as desirable and 37 percent as intermediate. A high 37 percent was classified as least desirable; usually a large proportion of this is the unpalatable *A. miser*. The type thus appears to be poor summer range for livestock. The combination of poor forage and lack of structural diversity makes this type also relatively poor habitat for wildlife.

**Other**—In the Bridger-Teton National Forest classification of aspen communities (Youngblood and Mueggler 1981), the *P. tremuloides / A. miser* type name encompassed a broader range of composition than does the current POTR/ASMI c.t. On the other hand, many of the current POTR/ASMI communities were included as part of the *P. tremuloides / Juniperus communis / A. miser* and *P. tremuloides / Carex geyeri* types in the Utah classification (Mueggler and Campbell 1986). The minimum quantity of *J. communis* required in the Utah classification was 5 percent rather than the 10 percent break point now used. Thus, stands with between 5 and 10 percent *J. communis* are now placed in the POTR/ASMI c.t.

## *Populus tremuloides/Juniperus communis/Astragalus miser* Community Type (POTR/JUCO/ASMI c.t.)

**Distribution**—This incidental community type appeared primarily on the north slope of the Uinta Mountains in northeastern Utah where it accounts for 4 percent of the aspen communities on the Ashley National Forest. One stand was on the Markagunt Plateau in southern Utah. The type was not seen in either Wyoming, Idaho, or Nevada. Over three-fourths of the stands were growing at elevations in excess of 8,000 ft (2,400 m), which is fairly high for aspen communities in northern Utah. These stands occurred primarily on gentle slopes and on soils derived from sedimentary parent rock.

**Vegetation**—This type is both structurally and compositionally more complex than the related POTR/ASMI c.t., primarily because of the greater amount of shrubs. The type is characterized by a *Populus tremuloides* overstory underlain by a shrub stratum dominated by *Juniperus communis*, and an herb stratum in which *Astragalus miser* is either the dominant or a readily apparent forb. A wide variety of conifers may be encountered in the tree stratum or as reproduction, but they are not yet prominent. These include *Abies lasiocarpa*, *Pinus contorta*, *Pseudotsuga menziesii*, and even *Pinus ponderosa*. Besides the dominant *J. communis* in the shrub stratum, other common members of this layer are *Symphoricarpos oreophilus*, *Berberis repens*, *Rosa woodsii*, and minor amounts of *Artemisia tridentata*. In addition to *A. miser* in the herb layer, *Achillea millefolium, Taraxacum officinale*, *Geranium viscosissimum*, and *Thalictrum fendleri* are common. The most frequently encountered grasses are *Agropyron trachycaulum*, *Stipa occidentalis,* and *Leucopoa kingii*. Annuals are usually scarce.

**Succession**—As with the POTR/ASMI c.t., this type is also grazing induced because of the usual abundance of herbs that are either low in palatability or highly resistant to grazing, such as *A. miser*, *A. millefolium*, and *T. officinale*. The type may be a grazing-induced version of a POTR/JUCO/CAGE c.t. with which it bears considerable similarity except for the amount of *Carex geyeri*. The presence of conifers in many of the stands suggests that some stands could eventually become dominated by an overstory of either *P. menziesii* or possibly *A. lasiocarpa*. Composition and location similarities suggest that some stands within this type in the the Uinta Mountains are probably seral stages within the *P. menziesii/ Berberis repens* habitat type, *C. geyeri* phase. Most of the stands, however, will probably remain dominated by an aspen overstory.

**Production**—The wood-producing potential is about the same as the somewhat similar POTR/ASMI c.t. Three stands were sampled for production. Total stand basal area averaged 152 $ft^2$/acre (35.0 $m^2$/ha), which was in the mid-range of all aspen stands. Average site index for aspen at 80 years, 40 ft (12.1 m), and projected volume production at stand maturity, 25 $ft^3$/acre/year (1.8 $m^3$/ha/year), were in the lowest quarter of all stands. Both tree density at 739 stems/acre (1,826/ha) and aspen reproduction at 442 suckers/acre (1,094/ha) were about average. The type, therefore, does not appear to be good for growing trees.

Undergrowth production was even less than in the poorly rated POTR/ASMI c.t. It averaged only 290 lb/acre (325 kg/ha) of air-dry material. Of this, 64 percent was forbs, 25 percent graminoids, and 11 percent shrubs. The overall ranking of the undergrowth as forage was poor, with only 27 percent of the cover classified as desirable and 48 percent as intermediate. The combination of low undergrowth production and low forage suitability renders the type poor summer range for livestock. For similar reasons, plus limited structural diversity, the type probably provides relatively poor habitat for wildlife.

**Other**—Communities of this structure and composition were identified by the same name in the Utah classification (Mueggler and Campbell 1986), but the minimum cover requirements for *J. communis* were 5 percent rather than the 10 percent used here. Consequently, the POTR/JUCO/ASMI c.t. in the Utah classification included many of the stands now contained in the POTR/ASMI c.t. Although aspen communities with a low shrub component dominated by *J. communis* have been reported to occur in southeastern Wyoming (Alexander and others 1986), *A. miser* is not a prominent part of the herbaceous cover.

## *Populus tremuloides/Juniperus communis/Lupinus argenteus* Community Type (POTR/JUCO/LUAR c.t.)

**Distribution**—This incidental community type has wide latitudinal distribution but is most frequent in the Uinta Mountains of northeastern Utah where it accounts for 5 percent of the aspen communities. Another cluster of stands was encountered on the Fishlake Plateau in southern Utah where it was 4 percent of the aspen communities on the Fishlake National Forest. The most northern stand was in the Wind River Mountains of eastern Wyoming. The type was not seen in either Nevada or Idaho. This is a fairly high elevation type. Over 90 percent of the stands were observed at elevations exceeding 8,000 ft (2,400 m). Over three-fourths of the stands were on north-facing or east-facing slopes and did not appear to be restricted by soil parent rock.

**Vegetation**—The vegetation of this type is similar to that of the POTR/JUCO/ASMI c.t. except for the prevalence of *Lupinus* spp. rather than *Astragalus miser* in the herbaceous layer. Stands consist of a tree layer dominated by *Populus tremuloides* with an occasional conifer, a shrub layer in which *Juniperus communis* is prominent, and usually a rather sparse herbaceous layer in which *Lupinus argenteus* is prominent. *Symphoricarpos oreophilus* and *Berberis repens* are frequently associated with *J. communis* in the shrub stratum. Forbs commonly associated with *Lupinus* spp. are *Antennaria microphylla, Thalictrum fendleri*, and *Taraxacum officinale*. No single graminoid is typical of the type. However, *Stipa occidentalis* and *Agropyron trachycaulum* are frequent, and occasionally *Bromus anomalus* or *Poa fendleriana* may be abundant. Annuals are usually scarce.

**Succession**—This community type represents a stable aspen situation, judging from the general lack of conifers in the stands examined. The undergrowth is fairly depauperate and may be the result of heavy past use by livestock. The similarity of the type to the POTR/JUCO/ASMI c.t. suggests that it may have derived from similar communities, such as the POTR/JUCO/CAGE c.t. Additional abusive grazing can only lead to further reduction of desirable forage species and a further increase of such species as *T. officinale*, *A. microphylla*, and perhaps *L. argenteus*.

**Production**—Production was evaluated on the basis of a single stand. Although tree basal area was considerably above average for aspen communities at 193 $ft^2$/acre (44.3 $m^2$/ha), the growth rate of aspen was in the lower third percentile of all stands. Site index at 80 years was only 44 ft (13.5 m), and estimated volume production only 32 $ft^3$/acre/year (2.2 $m^3$/ha/year). Tree density was low at 400 stems/acre (988/ha).

Annual production of undergrowth, however, was a moderate 766 lb/acre (859 kg/ha). Of this, 40 percent consisted of graminoids, 35 percent shrubs, and 25 percent forbs. This undergrowth was of intermediate suitability as livestock forage, with 41 percent classified as desirable and 46 percent as intermediate. The type is therefore moderately productive summer range for livestock. The value as wildlife habitat is limited because of the lack of good hiding cover.

**Other**—Communities now within this type were formerly absorbed as parts of the *P. tremuloides / J. communis / Sitanion hysterix* and *P. tremuloides / J. communis/ Carex geyeri* c.t.'s in the Utah classification (Mueggler and Campbell 1986). They are now regarded as sufficiently distinct to merit a separate category.

## *Populus tremuloides/Stipa comata* Community Type (POTR/STCO c.t.)

**Distribution**—The POTR/STCO c.t. is an infrequent but widely distributed type encountered as far north in the Region as the Centennial Mountains on the Targhee National Forest in Idaho and as far south as the Markagunt Plateau in southern Utah. It is most common on the Dixie Forest in southern Utah where it accounts for 7 percent of the aspen communities. It was also observed on the Fishlake, Ashley, and Wasatch-Cache National Forests. It was not seen in Nevada. The broad latitudinal distribution of this type accounts for a wide elevational range, from about 6,500 ft (2,300 m) at its northern extreme to between 8,500 and 9,500 ft (2,600 and 2,900 m) at the southern extreme on the Dixie National Forest. All stands sampled occupied gentle slopes and did not appear restricted by exposure. The soils were primarily derived from igneous parent rock, but a few stands were on sandstones.

**Vegetation**—The vegetation of this incidental type consists of only two strata and reflects the comparatively dry environment in which it occurs. The tree layer is almost exclusively *Populus tremuloides* with, in some cases, minor amounts of conifers. The undergrowth may contain minor amounts of such shrubs as *Juniperus communis*, *Artemisia tridentata*, *Berberis repens*, and even *Symphoricarpos oreophilus*, but not enough to form a distinct stratum. The herbaceous undergrowth is usually a rather depauperate mixture of grasses and forbs. The undergrowth is characterized by the prominence of one or more of the following grasses: *Stipa comata*, *Sitanion hystrix*, or *Festuca idahoensis*. Occasionally, *Poa fendleriana* may be abundant. The forb species most commonly found are *Taraxacum officinale*, *Lupinus argenteus*, *Antennaria microphylla*, and *Astragalus miser*. Annual species are usually scarce.

**Succession**—This generally appears to be a stable aspen type restricted to relatively dry sites. Where *Pinus ponderosa* is actively invading, the type will eventually succeed to a *P. tremuloides-P. ponderosa* cover type and eventually to a climax type within the *P. ponderosa* coniferous forest series. The abundance of *S. hystrix* and *T. officinale* suggests that the undergrowth has been appreciably degraded by prolonged and heavy livestock grazing. *Poa fendleriana*, *Bromus ciliatus*, and possibly *S. oreophilus* were likely more abundant in many of these stands prior to the advent of domestic livestock. Continued abusive grazing would favor an even greater abundance of such low-palatability species as *S. hystrix* and *A. microphylla* and a loss of species that are more palatable to sheep and cattle.

**Production**—Six stands were sampled in the POTR/STCO c.t. to obtain an estimate of productivity. Both tree density at 586 stems/acre (1,445/ha) and stand basal area at 152 $ft^2$/acre (34.8 $m^2$/ha) were in the middle third of all aspen stands. Factors indicative of the growth rate of aspen, however, ranked in the lower third of all stands. Aspen site index averaged only 43 ft (13.1 m), and estimated volume production of aspen at stand maturity averaged only 30 $ft^3$acre/year (2.1 $m^3$/ha/year). Aspen reproduction was moderate at 1,070 suckers/acre (2,643/ha). Thus, the potential of the type for the production of wood fiber appeared to be below average for all aspen stands.

The production of undergrowth was poor. An average of only 460 lb/acre (516 kg/ha) of air-dry herbage was produced, which ranks the type in the lower quarter of all stands. This was divided about equally between graminoids at 53 percent and forbs at 45 percent, with only an average 2 percent of shrubs. This meager undergrowth, however, ranked fairly well as livestock forage, with 59 percent desirable and 38 percent intermediate. Despite the desirable quality of the undergrowth, the type ranks only fair as summer range for livestock because of the relatively small amount of forage produced. The type is poor habitat for wildlife because of poor structural diversity of the vegetation combined with low forage productivity.

**Other**—Aspen communities formerly identified in the Utah classification (Mueggler and Campbell 1986) as being in the *P. tremuloides / S. hysterix* c.t. are now in the POTR/STCO c.t.

## *Populus tremuloides/ Shepherdia canadensis* Community Type (POTR/SHCA c.t.)

**Distribution**—The POTR/SHCA c.t. is a local, incidental type encountered only in eastern Idaho and western Wyoming. Greatest concentration was in the vicinity of the Gros Ventre Range where it accounts for 4 percent of the aspen communities on the Bridger-Teton National Forest. The type also was observed along the Webster Range on the Caribou National Forest and in the Centennial Mountains of the Targhee National Forest. Most of the stands grew at elevations between 7,000 and 8,000 ft (2,100 and 2,400 m), which is moderately high for aspen communities at the latitude of eastern Idaho and adjacent Wyoming. These stands usually occupied the mid to low positions on fairly steep slopes. Soil parent materials did not appear to be limiting.

**Vegetation**—The POTR/SHCA c.t. is distinguished by the prominence of *Shepherdia canadensis* in a shrub stratum below the predominantly *Populus tremuloides* overstory. Conifers, especially *Abies lasiocarpa* and *Picea engelmannii*, are frequently present in small amounts, usually as reproduction. In addition to *S. canadensis*, the shrub stratum commonly contains appreciable amounts of *Rosa woodsii* and *Symphoricarpos oreophilus*. Occasionally, *Pachystima myrsinites* is also abundant. The herb layer is a composite of graminoids and forbs, with the latter usually the most abundant. The most common and usually most abundant forbs are *Geranium viscosissimum*, *Lupinus argenteus*, *Thalictrum fendleri*, *Osmorhiza chilensis*, and *Fragaria vesca*. A wide variety of graminoids may be found, no one of which appears typical. The most common are *Agropyron trachycaulum* and *Bromus ciliatus*. Sometimes *Calamagrostis rubescens* can be abundant. Annuals are usually scarce.

**Succession**—The majority of stands were successional to a *P. tremuloides—A. lasiocarpa / S. canadensis* c.t., which eventually should succeed to conifer dominance within the *A. lasiocarpa* forest climax series. It is most likely a seral community within the *S. canadensis* phase of the *A. lasiocarpa / Arnica cordifolia* habitat type described by Steele and others (1983). The rate of this successional sequence depends, of course, on the rapidity of conifer establishment in the stands and the lack of any further disturbance that would destroy this regeneration.

**Production**—Only a single stand was sampled for production. The stand basal area was 136 ft²/acre (31.2 m²/ha), aspen site index was 49 ft (14.9 m), and estimated volume production was 38 ft³/acre/year (2.6 m³/ha/year). All of these measurements of tree productivity ranked in the mid-third percentile of all aspen stands.

Production of undergrowth also ranked in the mid-third percentile at 1,035 lb/acre (1,161 kg/ha). Of this, 45 percent consisted of forbs, 35 percent graminoids, and 20 percent shrubs. The quality of the undergrowth as livestock forage was reasonably good, with 48 percent desirable and 46 percent intermediate. From this limited sample, the POTR/SHCA c.t. appears to be moderately good summer range for livestock as well as fairly good habitat for wildlife.

**Other**—Communities of this composition were identified in the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981) with the same name. In addition, some of the stands placed in the *P. tremuloides / Juniperus communis* c.t. in that classification are now included in the POTR/SHCA c.t. Aspen communities with *S. canadensis* as a major shrub have not been reported to occur outside of the Intermountain Region.

## *Populus tremuloides—Abies lasiocarpa/Shepherdia canadensis* Community Type (POTR-ABLA/SHCA c.t.)

**Distribution**—The POTR-ABLA/SHCA c.t. is a relatively local type confined to an area similar to that of the POTR/SHCA c.t. The type is concentrated on the Gros Ventre and Wyoming Ranges of western Wyoming where it accounts for 5 percent of the aspen communities on the Bridger-Teton National Forest. It was also observed along the Bear River Range in eastern Idaho and northern Utah. This type was not seen in central or southern Utah or in Nevada. The type was at moderately high elevations for this latitude, ranging from 7,000 to 8,300 ft (2,100 to 2,500 m). The 11 stands sampled generally occupied moderately steep slopes that had northerly or easterly exposures.

**Vegetation**—The vegetation is fairly complex structurally, consisting of a tree layer dominated by *Populus tremuloides*, but with substantial amounts of conifers, a shrub stratum, and a mixed grass and forb herb stratum. *Abies lasiocarpa* or *Picea engelmannii* are always prominent in the tree stratum or as reproduction. *Pinus contorta* and *P. flexilis* may also be present in varying amounts. *Shepherdia canadensis*, always prominent member in the shrub layer, is frequently accompanied by sometimes considerable amounts of *Pachystima myrsinites*, *Symphoricarpos oreophilus*, *Rosa woodsii*, or *Berberis repens*. The herbaceous undergrowth is usually dominated by forbs, although a variety of graminoids may be present, particularly *Elymus glaucus*. The most common and abundant herbs usually are *Thalictrum fendleri*, *Osmorhiza chilensis*, *Arnica cordifolia*, *Epilobium angustifolium*, and *Lupinus* spp. The type seldom has many annual species.

**Succession**—This community type is closely related to the POTR/SHCA c.t. and is a later stage in succession that will eventually lead to an *A. lasiocarpa* climax forest. The presence of either *A. lasiocarpa* or *P. engelmannii* as codominants with *P. tremuloides* in the overstory, or as substantial reproduction, is the principal difference between this and the POTR/SHCA c.t. As succession proceeds from a POTR/SHCA c.t. to a POTR-ABLA/SHCA c.t., such species as *R. woodsii*, *Bromus ciliatus*, *E. angustifolium*, *Fragaria vesca*, *G. viscosissimum*, and *Lupinus* spp. tend to decrease in abundance. The type probably represents a successional stage within the *A. lasiocarpa/Arnica cordifolia* habitat type, *S. canadensis* phase (Steele and others 1983).

**Production**—The production data base consists of a single stand in which the undergrowth was overwhelmingly dominated by the shrub *S. canadensis*. Undergrowth production, 1,114 lb/acre (1,249 kg/ha), was in the upper third percentile of all aspen stands. The stand is somewhat unusual in that 90 percent of the undergrowth was shrubs, with only 9 percent forbs and 1 percent graminoids. Overall tree basal area was above average at 170 $ft^2$/acre (39.1 $m^2$/ha), but aspen growth factors were in the lower third percentile of all stands. Aspen site index at 80 years was only 43 ft (13.2 m), and volume production at stand maturity was only 30 $ft^3$/acre/year (2.1 $m^3$/ha/year). This stand was being actively invaded by *A. lasiocarpa*, with over 4,500 established seedlings growing per acre (11,000/ha). Based on this single stand, the type appears to be only fair for the production of wood fiber and rather poor range for livestock. On the other hand, it is believed to provide relatively good habitat for wildlife.

**Other**—These communities were identified previously in the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981) under the same name. In addition, some of the communities classified as in the *P. tremuloides—A. lasiocarpa / B. repens* c.t. in that classification are now included in the POTR-ABLA/SHCA c.t.

## *Populus tremuloides—Abies lasiocarpa/Amelanchier alnifolia* Community Type (POTR-ABLA/AMAL c.t.)

**Distribution**—This infrequent but widely distributed community type was observed as far north as the Snake River Range on the Caribou National Forest in eastern Idaho and as far south as the Abajo Mountains in southeastern Utah. Greatest concentration was along the Bear River and Wasatch Ranges of northern Utah. It was not observed in Nevada. The type occurred at the lower edge of the *Abies lasiocarpa* zone. Stands in the northern part of the Region were at elevations between 5,800 and 7,800 ft (1,770 and 2,400 m), whereas those in the Abajo Mountains were at about 8,500 ft (2,600 m). The type occupied primarily moderate to steep slopes with a northerly aspect. Soil parent rock did not appear to be limiting.

**Vegetation**—The POTR-ABLA/AMAL c.t. contains considerable structural and species diversity. The vegetation has four more or less distinct layers. The tree overstory is dominated by *Populus tremuloides* but has a substantial amount of *Abies lasiocarpa* or *Picea engelmannii* that may be accompanied by other conifers as well. The tall shrub layer is typified by the presence of *Amelanchier alnifolia, Prunus virginiana,* or *Acer grandidentatum.* A pronounced low shrub layer exists that usually has *Symphoricarpos oreophilus* as its most abundant constituent. Other frequently abundant shrubs include *Rosa woodsii, Berberis repens,* and *Pachystima myrsinites.* The herbaceous layer usually contains a fairly rich mixture of tall forbs, low forbs, and graminoids, no single species of which is present in great abundance. The most common tall forbs in the type are *Senecio serra, Aster engelmannii, Hackelia floribunda,* and *Agastache urticifolia.* Among the low forbs, *Thalictrum fendleri, Osmorhiza chilensis,* and *Stellaria jamesiana* are most frequent. In some stands, *Lathyrus* spp. provide considerable ground cover. A wide variety of graminoids occur in this type, but only *Elymus glaucus* had high constancy. Annual plants are seldom abundant.

**Succession**—The type obviously represents a seral stage within the *A. lasiocarpa* coniferous forest series. The natural process of succession will lead to overstory dominance by *A. lasiocarpa*. Judging from comparisons of species constancies (appendix E), the type represents a seral stage within either the *A. lasiocarpa / B. repens* or *A. lasiocarpa / O. chilensis* habitat types (Mauk and Henderson 1984), most likely the former. As conifers become more prevalent, the shrubby and herbaceous undergrowth tends to become less abundant, less diverse, and shifts in composition toward the more shade-tolerant species. Heavy grazing tends to suppress the *S. oreophilus* and *A. engelmannii*, and to favor *P. myrsinites* and *B. repens*. If grazed by cattle, composition would additionally tend to shift away from the grasses and toward a greater abundance of *T. fendleri* and *O. chilensis*. Heavy sheep grazing would tend to favor the grasses at the expense of the more palatable forbs and shrubs.

**Production**—Productivity for trees is in the mid-range of all aspen stands, judging from the five stands in the type sampled. Total basal area averaged 146 $ft^2$/acre (33.5 $m^2$/ha), 87 percent of which was aspen. Site index for aspen at 80 years was 53 ft (16.2 m), and estimated volume growth at stand maturity was 43 $ft^3$/acre/year (3.0 $m^3$/ha/year). Aspen reproduction was fairly high, averaging 2,119 suckers/acre (5,236/ha), but conifers were becoming established with 145 seedlings/acre (358/ha). The density of aspen trees averaged 562 stems/acre (1,388/ha).

Undergrowth productivity was also in the upper third percentile of all aspen stands, averaging 1,162 lb/acre (1,303 kg/ha). This undergrowth was primarily forbs, an average 44 percent, and shrubs, 42 percent, with graminoids the remaining 14 percent. The composition of this undergrowth was in the mid-range of forage suitability, with 52 percent rated as desirable and 40 percent as intermediate. The type is therefore good livestock range, particularly for sheep, if succession has not progressed to the point where conifers are appreciably suppressing the production of shrubs and herbs. The type is excellent wildlife habitat because of the large amount of structural diversity: an overstory consisting of both aspen and conifers, a tall shrub layer, a low shrub layer, and an herb layer of forbs and grasses.

**Other**—These communities were classified under the same name in the Utah aspen classification (Mueggler and Campbell 1986) but were given the name *P. tremuloides—A. lasiocarpa / P. virginiana* c.t. in the Bridger-Teton National Forest classification.

## *Populus tremuloides—Abies lasiocarpa/Symphoricarpos oreophilus/Bromus carinatus* Community Type (POTR-ABLA/SYOR/BRCA c.t.)

**Distribution**—This infrequent seral type is widely distributed in Utah and occurs at least as far north as the Bear River Range and as far south as the Markagunt Plateau. The type was not seen in either Wyoming, Idaho, or Nevada. This is a moderate elevation type, usually growing between 8,000 and 9,000 ft (2,400 and 2,700 m) on gentle to moderately steep slopes, irrespective of aspect.

**Vegetation**—The type essentially has three strata: a predominantly *Populus tremuloides* tree layer that contains substantial amounts of *Abies lasiocarpa* and sometimes other conifers, a low shrub stratum consisting of *Symphoricarpos oreophilus* and frequently *Rosa woodsii,* and an herbaceous stratum that is heavy toward grasses and light on those forbs that serve as indicators of other types. The herbaceous undergrowth is generally sparse. The characterizing grasses, *Bromus carinatus*, *Agropyron trachycaulum*, and *Elymus glaucus*, are individually or collectively readily apparent and often prominent. Occasionally, *Carex geyeri* or *Poa pratensis* may be abundant. Although a variety of forbs often occurs in this type, seldom will one species provide much ground cover. The exception are *Lathyrus* spp., which frequently are abundant. The other forbs that occur most frequently but in minor quantities are *Achillea millefolium, Thalictrum fendleri, Geranium viscosissimum,* and *Osmorhiza chilensis.* Annuals usually are common.

**Succession**—This is a minor seral community type that reflects the effect of both succession to conifers and heavy past grazing. The frequent presence of minor amounts of members of the tall forb group of species, particularly *Senecio serra, Rudbeckia occidentalis, Hackelia floribunda, Aster engelmannii,* and *Agastache urticifolia,* suggests that this type is a grazing-altered version of the major POTR-ABLA/SYOR/TALL FORB c.t., which in turn represents a seral stage in the *A. lasiocarpa* coniferous forest climax series. The type probably occurs within the *A. lasiocarpa / O. chilensis* habitat type described by Mauk and Henderson (1984). Heavy, prolonged grazing by sheep has likely permitted the grasses and less palatable forbs to increase at the expense of the palatable forbs. Under the normal course of succession, the amount and diversity of this herbaceous undergrowth will diminish as the conifers increasingly dominate the tree layer.

**Production**—The single stand sampled for production fell within the mid-third percentile of all stands in production of aspen but in the lower quarter of all stands in the production of undergrowth. Aspen site index was 45 ft (13.7 m), potential volume production was 33 ft$^3$/acre/year (2.3 m$^3$/ha/year), and tree density was 1,134 stems/acre (2,802/ha). Total basal area was 106 ft$^2$/acre (24.3 m$^2$/ha), 8 percent of which was conifers.

The stand produced only 544 lb/acre (610 kg/ha) of undergrowth, which was of moderate value as livestock forage. This measurement is probably somewhat low and not truly represenative of the type, which generally appears more productive. In any event, the type provides good habitat for wildlife because of the fairly high amount of structural diversity.

**Other**—This type was not recognized as a separate entity in the earlier classifications within the Region.

## *Populus tremuloides—Abies lasiocarpa/Symphoricarpos oreophilus/Thalictrum fendleri* Community Type (POTR-ABLA/SYOR/THFE c.t.)

**Distribution**—This infrequent type is widely distributed across the Region. It occurred on nine of the 11 National Forests within the study area. The exceptions were the Targhee in Idaho and the Toiyabe in Nevada. The type was most common along the Bear River Range in Idaho and northern Utah, but even there it was scarce. The type generally was at midelevations between 7,000 and 7,500 ft (2,100 and 2,300 m) in southeastern Idaho and between 8,000 and 9,000 ft (2,400 and 2,700 m) in southern Utah. It occupied primarily mid-slope positions of moderately steep slopes with northeasterly exposures. Soil parent materials did not appear to be restrictive.

**Vegetation**—The vegetation of this minor seral community type was sampled on the basis of 15 stands. The overstory, although still dominated by *Populus tremuloides*, has prominent amounts of *Abies lasiocarpa* or *Picea engelmannii* either in the tree canopy or as reproduction. Other conifers that may be present in substantial amounts include *Pinus contorta* and *Pseudotsuga menziesii.* Low shrubs are usually fairly abundant. The most common and abundant are *Symphoricarpos oreophilus*, *Berberis repens*, *Rosa woodsii*, and *Pachystima myrsinites*. The herbaceous undergrowth consists of a mixture of forbs and graminoids but is characterized by the prominence of *Thalictrum fendleri*, *Osmorhiza chilensis*, or *Geranium viscosissimum*. Other forbs that sometimes occur in considerable abundance are *Lupinus argenteus*, *Arnica cordifolia*, and *Fragaria vesca*. A wide variety of graminoids may be observed, but none appears to characterize all stands. The most frequently encountered are *Elymus glaucus*, *Bromus carinatus*, *Carex geyeri*, and *Carex rossii*, none of which occurred in more than half the stands. Annual plants are usually scarce.

**Succession**—The amounts and species of conifers indicate that the type will eventually succeed to the *A. lasiocarpa* coniferous forest climax series. Comparisons of species composition suggest that this probably is a seral stage within possibly both the *A. lasiocarpa / B. repens* and *A. lasiocarpa / O. chilensis* habitat types (Mauk and Henderson 1984; Youngblood and Mauk 1985). As in other such seral types, this successional process is usually accompanied by a reduction in the amount and diversity of undergrowth cover as light intensity at the forest floor decreases with increased amounts of conifers in the tree canopy.

**Production**—The four stands sampled for productivity averaged 192 ft$^2$/acre (44.2 m$^2$/ha) of stand basal area, which was in the upper quarter of all aspen stands; 80 percent of this consisted of aspen. However, the potential of the type for aspen growth appears about average for all stands. Site index at 80 years averaged 48 ft (14.5 m), and estimated volume production at stand maturity averaged 36 $ft^3$/acre/year (2.5 $m^3$/ha/year). Average tree density was good at 983 stems/acre (2,429/ha). Aspen reproduction averaged a moderate 790 suckers/acre (1,951/ha). Eventual replacement of the aspen by conifers was evidenced by the presence of an average 402 established *A. lasiocarpa* seedlings/acre (993/ha). The type thus appears to have at least a moderate potential for the production of wood fiber.

Annual production of undergrowth averaged a moderate 757 lb/acre (849 kg/ha). The bulk of this usually was forbs, an average 81 percent, with 14 percent shrubs and only 5 percent graminoids. The suitability of the undergrowth as livestock forage was good; 60 percent was classified as desirable. The type is at least moderately productive summer range for livestock, particularly for sheep, because of the abundance of forbs. It also is fairly good wildlife habitat because of the diversity of the vegetation in both the tree stratum and in the undergrowth.

**Other**—Communities with this structure and composition were not treated as a separate type in the previous classifications. However, they were a major part of the *P. tremuloides—A. lasiocarpa / S. oreophilus / C. geyeri* c.t. in the Utah classification (Mueggler and Campbell 1986). These communities were also included in the more general *P. tremuloides—A. lasiocarpa / S. oreophilus* c.t. of the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982) and in the *P. tremuloides—A. lasiocarpa / B. repens* c.t. of the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981).

## *Populus tremuloides—Abies lasiocarpa/Juniperus communis* Community Type (POTR-ABLA/JUCO c.t.)

**Distribution**—The POTR-ABLA/JUCO c.t. is an incidental type seldom seen except on the high plateaus of southern Utah where it accounts for 6 percent of the aspen communities on both the Dixie and Fishlake National Forests. The type also occurred in the Uinta Mountains of northeastern Utah and in the Snake Range of eastern Nevada. It was not observed in either eastern Idaho or western Wyoming. This is a fairly high elevation type. All 19 of the stands sampled were between 8,000 and 10,000 ft (2,400 and 3,000 m). The type does not appear to be restricted by slope aspect or soil parent rock.

**Vegetation**—The vegetation is characterized by the prominence of a low shrub stratum dominated by *Juniperus communis* below a mixed aspen-conifer overstory in which *Abies lasiocarpa* or *Picea engelmannii* are prominent. Tall shrub species are generally lacking. Shrubs that frequently accompany *J. communis* in the low shrub layer are *Symphoricarpos oreophilus*, *Rosa woodsii*, and *Berberis repens*. The herbaceous stratum is usually sparse. The most commonly encountered graminoids are *Carex rossii*, *Bromus anomalus*, and *Stipa occidentalis*. The forb element usually consists of such low-growing species as *Achillea millefolium*, *Taraxacum officinale*, *Fragaria vesca*, and *Astragalus miser*. Few annual plants occur in this type.

**Succession**—The type obviously represents a seral stage within the *A. lasiocarpa* coniferous forest series, probably within the *A. lasiocarpa / J. communis* habitat type (Youngblood and Mauk 1985), judging from comparisons of species composition. As with other such aspen communities seral to coniferous forests, dominance by *Populus tremuloides* can only be maintained by such extreme disturbances as burning, clearcutting, or selective removal of the conifers to set back the successional process. Heavy livestock grazing within this type tends to change the herbaceous composition even more to favor the *A. miser*, *F. vesca*, and *T. officinale*. The abundance of the shrubby *J. communis* undergrowth would likely increase as well.

**Production**—Judgment of the productivity potential of the POTR-ABLA/JUCO c.t. is based upon a sample of one stand. Although the type appears at least moderately productive of wood fiber, production of undergrowth is poor. Total tree basal area in this one stand was 161 $ft^2$/acre (37.1 $m^2$/ha), almost three-fourths of which was aspen. Aspen growth potential was in the mid-third percentile of all stands with a site index of 56 ft (17.1 m) at 80 years and estimated volume production of 47 $ft^3$/acre/year (3.3 $m^3$/ha/year). Aspen reproduction was a low 232 suckers/acre (574/ha), whereas established reproduction of *A. lasiocarpa* and *P. engelmannii* was 168 seedlings/acre (415/ha). The stand produced only 258 lb/acre (298 kg/ha) of undergrowth, which is in the lowest 10 percent of all aspen stands. The bulk of this undergrowth was forbs at 62 percent, with 35 percent shrubs and only 3 percent graminoids. What little there was appeared to provide fairly good forage, with 51 percent classified as desirable and 48 percent as intermediate. The generally low quantity of forage limits the value of this type as livestock range. It is also of only moderate value as wildlife habitat because neither vegetation structure nor plant species diversity are great.

**Other**—Communities of this structure and composition were treated under the same type name in the Utah classification (Mueggler and Campbell 1986).

## *Populus tremuloides—Abies lasiocarpa/Carex geyeri* Community Type (POTR-ABLA/CAGE c.t.)

**Distribution**—This incidental seral type is widely distributed from Idaho and Wyoming to southern Utah. It occurred on the Wyoming and Salt River Ranges in western Wyoming, the Portneuf Range in eastern Idaho, and from the Bear River Range in northern Utah southward to the Abajo Mountains in southeastern Utah. The type was not seen in Nevada. In the northern part of the Region it usually occurs at elevations between 6,000 and

7,500 ft (1,800 and 2,300 m) and at the southern extreme at elevations between 9,000 and 10,000 ft (2,700 and 3,000 m). The type was on gentle and moderately steep slopes and on soils derived from both igneous and sedimentary parent rock.

**Vegetation**—The prominence of either *Carex geyeri* or *Calamagrostis rubescens* (usually the former) in the herb stratum and the lack of a distinct shrub stratum characterize the undergrowth of this successional type. The tree layer is a variable mixture of *Populus tremuloides* and either *Abies lasiocarpa* or *Picea engelmannii* or both. Other conifers are often present as well, particularly *Pseudotsuga menziesii*. Although shrubs frequently occur in this type, no single characterizing species is prominent. Among the most common shrubs are *Symphoricarpos oreophilus*, *Rosa woodsii,*, and *Berberis repens*. In addition to the characterizing *C. geyeri* or *C. rubescens* in the herb layer, other grasses occasionally abundant are *Elymus glaucus* and *Bromus ciliatus*. This type usually has a more diverse mixture of forbs than either the POTR-ABLA/JUCO or POTR-ABLA/CARO types, but all of the forbs are fairly low in stature. The most common and usually most abundant of these are *Thalictrum fendleri*, *Achillea millefolium*, *Osmorhiza chilensis,* and *Taraxacum officinale*. Occasionally, *Astragalus miser*, *Geranium viscosissimum*, or *Lathyrus* spp. will be abundant. Annuals are not usually abundant.

**Succession**—The POTR-ABLA/CAGE c.t. is a seral stage within the *A. lasiocarpa* forest climax series. In the southern part of the Region, this occurs within the *A. lasiocarpa / C. geyeri* habitat type as described by Youngblood and Mauk (1985). In the northern part of the Region, this seral type appears most closely related compositionally to the *A. lasiocarpa / C. rubescens* habitat type (Mauk and Henderson 1984; Steele and others 1983), even though the similarity index comparisons are not high (appendix E). Heavy grazing will likely lead to impoverishment of the few palatable plants and favor an increase in dominance of such grazing-resistant species as *T. officinale*, *A. miser*, and *A. millefolium*.

**Production**—This incidental type is above average in the production of trees and below average in production of forage. Total tree basal area for the five stands sampled for production averaged a fairly high 169 ft$^2$/acre (38.9 m$^2$/ha). Conifers were 14 percent of this. Aspen growth was moderate, with a site index at 80 years averaging 46 ft (14.0 m) and estimated volume production of 34 ft$^3$/acre/year (2.4 m$^3$/ha/year). Aspen reproduction averaged a moderate 617 suckers/acre (692/ha), but conifers appeared to be vigorously invading. An average of over 3,800 established seedlings per acre (9,390/ha) of *A. lasiocarpa* occurred in these stands.

Only 617 lb/acre (692 kg/ha) of undergrowth was produced annually, which is in the lower third percentile of all stands. This generally consisted of a balanced mixture of forbs at 55 percent and graminoids at 43 percent, with only 2 percent shrubs. The POTR-ABLA/CAGE c.t. provides below-average summer range for livestock, primarily because of low forage productivity. As conifers increase in a stand, forage production becomes progressively less. Wildlife habitat values are usually low because the vegetation lacks diversity in both species composition and community structure.

**Other**—The POTR-ABLA/CAGE c.t. was identified by this name in the Utah aspen classification (Mueggler and Campbell 1986). Although this seral type has not been specifically identified as occurring outside of the Intermountain Region, similar seral communities can probably be found, at least in northwestern Colorado. Hoffman and Alexander (1980, 1983) identified an *A. lasiocarpa / C. geyeri* habitat type on the Routt and White River National Forests that has *P. tremuloides* as a major seral tree.

## *Populus tremuloides—Pinus contorta/ Symphoricarpos oreophilus* Community Type (POTR-PICO/SYOR c.t.)

**Distribution**—This minor seral community type was observed only on National Forests in the northern part of the study area: the Targhee, Caribou, Wasatch-Cache, and Ashley. Greatest abundance was on the Caribou Range in southeastern Idaho and the Uinta Mountains of northeastern Utah. The type was not encountered on the northern Nevada forests. The POTR-PICO/SYOR c.t. appears to be adapted to a wide range of environments. It occurred at elevations ranging from 5,700 to 9,800 ft (1,700 to 3,000 m), and did not appear confined by slope, exposure, or soil parent materials.

**Vegetation**—This is one of four seral aspen types in which *Pinus contorta* is the only prominent conifer in the tree layer. The undergrowth is characterized by a low shrub stratum in which *Symphoricarpos* spp., *Rosa* spp., or *Pachystima myrsinites* are prominent. The tall-growing shrubs *Amelanchier alnifolia* or *Prunus virginiana* are frequently present and sometimes are abundant. The herbaceous stratum generally has a comparative abundance of the graminoids *Calamagrostis rubescens* or *Carex geyeri*. *Elymus glaucus* is often present. A variety of low-growing forbs have been observed in this type, the most frequent of which are *Thalictrum fendleri*, *Lupinus argenteus*, *Geranium viscosissimum*, *Osmorhiza chilensis*. *Achillea millefolium*, and *Fragaria vesca*. Although the undergrowth is usually not lush, it is often fairly diverse. Annuals are usually scarce.

**Succession**—This is a seral type in which succession is obviously away from dominance by *Populus tremuloides* and toward dominance by the more shade-tolerant conifers. *Populus tremuloides* is gradually being replaced by *P. contorta*. Many of the stands within this type will likely be dominated eventually by *Abies lasiocarpa*, judging by the reproduction of this conifer. This is probably a seral stage within the *A. lasiocarpa / O. chilensis* habitat types of the northern part of the Region (Mauk and Henderson 1984; Steele and others 1983). As the conifer cover increases, the amount and the diversity of undergrowth, especially of herbs, will decrease. Heavy grazing by cattle will likely result in a decrease in the amount of *C. rubescens*, *C. geyeri*, and *E. glaucus* and an increase of the grass *Poa pratensis* and many of the low-growing forbs. Heavy grazing by sheep will probably favor the graminoids to the detriment of many of the forbs and shrubs.

**Production**—The potential for the production of wood is slightly below the average for all aspen stands. Total tree basal area for the two stands sampled averaged 126 $ft^2$/acre (29.0 $m^2$/ha). Site index at 80 years for aspen was only 39 ft (11.7 m) and volume production only 24 $ft^3$/acre/year (1.7 $m^3$/ha/year). Both of these growth estimates were in the lower quartile of all stands. Aspen reproduction averaged a moderate 1,006 suckers/acre (2,484/ha), with tree density averaging 1,398 stems/acre (3,454/ha).

The production of undergrowth was a moderate 857 lb/acre (961 kg/ha). Of this, 54 percent was forbs, 31 percent shrubs, and only 15 percent graminoids. The suitability of the undergrowth as forage for livestock was considered good, with 60 percent classified as desirable and only 1 percent as least desirable. The type thus appears to provide at least moderately good summer range for livestock. It is probably more suitable for sheep than for cattle because of the relative abundance of forbs and shrubs. The type also provides fairly good habitat for wildlife because of the diversity of vegetation structure.

**Other**—Communities of this type were included in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982) as part of the *P. tremuloides—P. contorta / C. rubescens* c.t.

## *Populus tremuloides—Pinus contorta/ Thalictrum fendleri* Community Type (POTR-PICO/THFE c.t.)

**Distribution**—This is a minor seral type with limited distribution. It was observed only on the north slope of the Uinta Mountains and on the east face of the Bear River Range of northern Utah. The seven stands sampled ranged in elevation from 7,100 to 8,900 ft (2,200 and 2,700 m). These stands occupied relatively gentle slopes with northerly and easterly exposures. Most were on soils derived from sandstone or quartzite.

**Vegetation**—This type is generally similar in composition to the POTR-PICO/SYOR c.t. except for the amount of shrubs in the undergrowth. Shrubs are frequently present, especially *Pachystima myrsinites*, *Rosa woodsii*, *Symphoricarpos* spp., and *Amelanchier alnifolia*, but they are never a prominent part of the undergrowth. The tree layer is a composite of *Populus tremuloides* and *Pinus contorta*, among which other conifers, especially *Abies lasiocarpa*, may be present in minor quantities. The undergrowth primarily is a mixture of herbaceous plants dominated by low-growing forbs. The prominence of either *Thalictrum fendleri*, *Geranium viscosissimum*, or *Osmorhiza chilensis* characterizes this undergrowth. Other frequent forbs are *Fragaria vesca* and *Achillia millefolium*. Occasionally, *Lathyrus* spp. may be abundant. The principal grasses usually are *Elymus glaucus* and *Agropyron trachycaulum*. Annuals are generally scarce.

**Succession**—The mixed aspen and conifer overstory in this seral type will eventually give way to complete dominance by *P. contorta*. Judging from the high constancy of *A. lasiocarpa*, the successional process should gradually lead to a type within the *A. lasiocarpa* coniferous forest climax series. In all probability, this would be within the *A. lasiocarpa / O. chilensis* habitat type (Mauk and Henderson 1984). At least some of the stands within this type could represent grazing degradations of the POTR-PICO/SYOR c.t. Heavy grazing may have caused a decrease in the amount of shrubs and graminoids typical of the latter.

**Production**—Tree production was evaluated on the basis of a single stand. Both stand basal area, 65 percent of which was aspen, and aspen growth measurements were in the mid-third percentile of all aspen stands. Basal area was 161 $ft^2$/acre (36.9 $m^2$/ha), aspen site index was 46 ft (13.9 m), and volume growth was 33 $ft^3$ /acre/year (2.3 $m^3$/ha/year). Aspen reproduction was 2,075 suckers/acre (5,127/ha). Only 199 established conifer seedlings were observed per acre (492/ha). Most of these were *A. lasiocarpa*, which suggests that stands within this type will eventually be dominated by this conifer. Undergrowth production was not measured. However, the type is generally less productive than most and will probably produce between 500 and 600 lb/acre (560 and 670 kg/ha) of air-dry herbage. The type is thus moderately good for the production of wood fiber but below average as livestock summer range. It also provides below-average habitat for wildlife because of the lack of structural diversity of the undergrowth.

**Other**—Communities of this composition were not identified as a separate type in any of the earlier aspen classifications.

## *Populus tremuloides—Pinus contorta/ Carex geyeri* Community Type (POTR-PICO/CAGE c.t.)

**Distribution**—Most examples of this type were on the Targhee and Ashley National Forests where it accounted for 4 percent of the aspen communities. It occurred primarily along the Centennial Range and Yellowstone Plateau of eastern Idaho and in the Uinta Mountains of northeastern Utah. It was not observed farther south in Utah or in Nevada. The type inhabited a relatively broad elevational zone, from 6,200 to 9,400 ft (1,900 to 2,900 m), usually gentle slopes of different aspects, and soils derived primarily from sandstone or quartzite parent rock.

**Vegetation**—This minor type has little structural diversity and is fairly simple compositionally. Although its structural diversity is enhanced by the mixture of conifers and aspen in the tree stratum, the undergrowth consists primarily of low-growing graminoids and forbs. The tree layer is both *Populus tremuloides* and *Pinus contorta*, with the occasional presence of other conifers, particularly *Abies lasiocarpa* and *Pseudotsuga menziesii*. The undergrowth consists principally of either *Carex geyeri* or *Calamagrostis rubescens*, with sometimes appreciable amounts of such forbs as *Lupinus argenteus*, *Osmorhiza chilensis*, *Geranium viscosissimum*, or *Thalictrum fendleri*. Shrubs may sometimes be present, especially *Juniperous communis* and *Berberis repens*, but they are never prominent. Annuals are usually scarce.

**Succession**—This is a seral type in which *P. contorta* will eventually dominate the overstory. Given sufficient time, either *P. menziesii* or *A. lasiocarpa* is likely to replace the *P. contorta*. This uncertain successional sequence results from the presence of reproduction of *A. lasiocarpa* in some of the stands within this type and of *P. menziesii* reproduction in other stands. Comparisons of species compositions suggest that the type is most likely a seral stage within both the *A. lasiocarpa / C. rubescens* and *P. menziesii / C. rubescens* habitat types (Mauk and Henderson 1984; Steele and others 1983). Heavy grazing by cattle will likely result in a reduction of the graminoids that now tend to dominate the undergrowth and a corresponding increase in the abundance of the low forbs. Heavy sheep grazing is likely to have the opposite effect: a reduction of the forbs and an increase in the graminoids. In either event, as the conifers increase in the overstory, overall production of the herbaceous undergrowth will decrease.

**Production**—The POTR-PICO/CAGE c.t. appears to be moderately productive of trees, and slightly below average for the production of forage. Five stands were sampled for estimates of production. These had an average stand basal area of 139 $ft^2$/acre (31.8 $m^2$/ha), 85 percent of which was aspen. Aspen growth was in the midrange of all stands with a site index of 46 ft (14.0 m) at 80 years and volume production at stand maturity of 34 $ft^3$/acre/year (2.4 $m^3$/ha/year). Aspen reproduction averaged 652 suckers/acre (1,611/ha), and conifer reproduction averaged 176 established seedlings/acre (435/ha). Of these young conifers 70 percent were *A. lasiocarpa*, which indicates that despite the prominence of *P. contorta* in the tree cover, the type will eventually succeed to dominance by *A. lasiocarpa*.

Undergrowth production averaged in the lower third percentile of all stands, producing 619 lb/acre (694 kg/ha). Of this production, 60 percent consisted of forbs, 37 percent graminoids, and only 3 percent shrubs. However, the quality of the undergrowth as livestock forage was good, with 61 percent classified as desirable and only 3 percent as least desirable. The type is thus fairly good summer range for livestock, at least until increased shading by conifers in the tree layer further reduces undergrowth productivity. The type is only moderately good wildlife habitat because of the lack of structural diversity in the undergrowth.

**Other**—This type was not identified in earlier classifications. Communities with this composition were included in the *P. tremuloides—P. contorta / C. rubescens* c.t. in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982). The few communities identified as *P. tremuloides—P. contorta / Vaccinium scoparium* c.t. in the Utah classification (Mueggler and Campbell 1986) have been included in the new POTR-PICO/CAGE c.t.

## *Populus tremuloides—Pseudotsuga menziesii/Amelanchier alnifolia* Community Type (POTR-PSME/AMAL c.t.)

**Distribution**—This incidental type, although fairly widespread, is most common in the northern half of the Region. It accounts for 4 percent of the aspen communities on the Targhee National Forest. The type was observed as far north as the Yellowstone Plateau in eastern Idaho and as far south as the LaSal Mountains in southeastern Utah. It was not seen in Nevada. This is a low to moderate elevation type, with almost 90 percent of the stands growing at less than 7,500 ft (2,300 m) and some as low as 5,600 ft (1,700 m). These stands were usually on moderate to steep slopes of various aspects and on soils derived primarily from sedimentary parent rock.

**Vegetation**—The vegetation of the POTR-PSME/AMAL c.t. is structurally diverse. It consists of a complex multilayered assemblage of trees, shrubs, and herbs. The characterizing feature of the overstory is the prominence of *Pseudotsuga menziesii* along with the prevalent *Populus tremuloides*. A tall shrub stratum is generally dominated by *Amelanchier alnifolia*, *Prunus virginiana*, or *Acer grandidentatum*. A distinct low shrub layer also exists in which *Symphoricarpos* spp., *Rosa woodsii*, or *Pachystima myrsinites* are prominent. *Berberis repens* also may be abundant. The herbaceous stratum consists primarily of a mixture of graminoids and low-growing forbs. The most frequently occurring and abundant of these are *Elymus glaucus*, *Thalictrum fendleri*, *Osmorhiza chilensis*, and *Geranium viscosissimum*. Occasionally, *Carex geyeri*, *Calamagrostis rubescens*, or *Arnica cordifolia* may be abundant. Although annuals are not uncommon, they are seldom abundant.

**Succession**—This type is a successional stage leading to a *P. menziesii* forest climax. Undergrowth species' similarities suggest the type most likely represents a seral stage within the *P. menziesii / O. chilensis* habitat type (Mauk and Henderson 1984; Steele and others 1983), but similarity of species' constancies are also high with the *P. menziesii / Acer glabrum* and *P. menziesii / B. repens* habitat types (appendix E). Heavy livestock use is likely to cause a decrease in abundance of *S. oreophilus* and *A. alnifolia* and an increase in less palatable species such as *B. repens*, *A. cordifolia*, and *G. viscosissimum*. In addition, heavy use by sheep will tend to suppress *O. chilensis* and *T. fendleri* and benefit the graminoids. On the other hand, heavy cattle use will tend to suppress the graminoids and favor the forbs.

**Production**—Five stands were sampled to evaluate productivity potential. The type is fairly productive of trees. Total tree basal area, 89 percent of which was aspen, averaged 170 $ft^2$/acre (39.0 $m^2$/ha). Site index for aspen at 80 years averaged 56 ft (17.2 m), and estimated volume production for aspen averaged 48 $ft^3$/acre/year (3.3 $m^3$/ha/year). All of these measurements were within at least the upper third of all aspen stands. Aspen reproduction was abundant, averaging 2,698 suckers/acre (6,309/ha). Established conifer seedlings, though not nearly so numerous, clearly indicate the successional status of the type. An average of 214 seedlings/acre (529/ha) of *P. menziesii* and 188 seedlings/acre (465/ha) of *A. lasiocarpa* were present. This suggests that many of the stands within this type will eventually succeed to *A. lasiocarpa* dominance.

The annual production of undergrowth was generally moderate, with an average of 922 lb/acre (1,034 kg/ha). This consisted of an average 45 percent forbs, 41 percent shrubs, and 14 percent graminoids. The undergrowth is in the mid-range of suitability as livestock forage. Of the cover 51 percent was classified as desirable and 45 percent as of intermediate suitability. The type provides at least moderately good summer range for livestock, particularly for sheep, because of the relative abundance of forbs and shrubs. The type is good wildlife habitat. Both the tree overstory and the undergrowth have good structural diversity, and the undergrowth consists of a diverse assemblage of species as well.

**Other**—Communities of this structure and composition were recognized by this name in both the Utah aspen classification (Mueggler and Campbell 1986) and the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982). They were recognized in the Bridger-Teton classification (Youngblood and Mueggler 1981) as the *P. tremuloides—P. menziesii / Spirea betulifolia* c.t. Aspen-dominated communities seral to *P. menziesii* coniferous forest types are present in Colorado (Johnston and Hendzel 1985), but this specific type was not identified.

## *Populus tremuloides—Pseudotsuga menziesii/Symphoricarpos oreophilus* Community Type (POTR-PSME/SYOR c.t.)

**Distribution**—The POTR-PSME/SYOR c.t. is an infrequent seral type that is widely distributed in the Region. It occurred as far north as the Yellowstone Plateau on the Targhee National Forest and as far south as the Aquarius Plateau on the Dixie National Forest. The type was not seen in Nevada. The greatest concentration of stands appeared to be in southern Idaho and northern Utah. It appears adapted to relatively low and moderate elevations. Almost 90 percent of the stands sampled were between 6,000 and 7,500 ft (1,800 and 2,300 m). The majority of stands occupied gentle to moderately steep slopes, irrespective of aspect. Although they grew on a wide variety of soils, most were on soil derived from sedimentary parent rock.

**Vegetation**—The vegetation is similar to that of the POTR-PSME/AMAL c.t. except for a lack of a tall shrub stratum. The tree layer is a mixture of *Populus tremuloides* and *Pseudotsuga menziesii*. Occasionally, *Abies lasiocarpa* may be present, but it is not prominent. The undergrowth is characterized by a low shrub stratum primarily of *Symphoricarpos* spp. and *Rosa woodsii*, often with minor quantities of other species. The herbaceous layer is similar to that in the POTR-PSME/AMAL c.t. The graminoids *Elymus glaucus*, *Calamagrostis rubescens*, and sometimes *Carex geyeri* can be abundant. The most commonly encountered forbs are *Thalictrum fendleri*, *Osmorhiza chilensis*, and *Geranium viscosissimum*. Occasionally, *Arnica cordifolia* is abundant. Annual plants are frequently present but usually sparse.

**Succession**—As with the POTR-PSME/AMAL c.t., this type is a seral stage within the *P. menziesii* coniferous forest climax series, likely within the *P. menziesii / O. chilensis*, *P. menziesii / C. rubescens*, or possibly *P. menziesii / Berberis repens* habitat types (appendix E). Heavy grazing by cattle will likely result in a decrease in the graminoids and an increase in the forbs. Heavy grazing by sheep will likely cause the *Symphoricarpos* spp. and more palatable forbs to decrease and favor the production of the graminoids. As the conifers gain dominance in the forest canopy, overall production of the undergrowth, particularly the herbaceous species, will decrease.

**Production**—Tree production is less and undergrowth production more in this type than in the POTR-PSME/AMAL c.t. Total tree basal area of the six stands sampled for production averaged only 137 $ft^2$/acre (31.5 $m^2$/ha); 86 percent of this was aspen. Site index for aspen averaged 54 ft (16.3 m), and estimated volume production of aspen at stand maturity averaged 44 $ft^3$/acre/year (3.1 $m^3$/ha/year). All of these measurements were in the mid-third percentile of all aspen stands. Aspen reproduction was a moderate 644 suckers/acre (1,593/ha). The primary conifers invading these communities were *P. menziesii* at 198 established seedlings/acre (489/ha) and *A. lasiocarpa* at 122 seedlings/acre (301/ha). Overall, this seral type is moderately productive of wood fiber.

The annual production of undergrowth was in the upper quarter percentile of all aspen stands with an average 1,257 lb/acre (1,409 kg/ha) of air-dry herbage. This averaged 50 percent graminoids, 39 percent forbs, and 11 percent shrubs. It was considered above average in suitability as summer forage for livestock with 55 percent of the cover classified as desirable and 38 percent as intermediate. It appears about equally suitable as summer range for both cattle and sheep. Although seen as fairly good wildife habitat, the lack of a tall shrub stratum somewhat limits its value. Thus, the POTR-PSME/SYOR c.t. is better livestock summer range than the POTR-PSME/AMAL c.t., but it is not as good a habitat for wildlife.

**Other**—Aspen communities of this composition were identified under this name in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982). They were included as a minor part of the *P. tremuloides—P. menziesii / C. rubescens* c.t. in the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981).

## *Populus tremuloides—Pseudotsuga menziesii/Juniperus communis* Community Type (POTR-PSME/JUCO c.t.)

**Distribution**—This seral type occurs infrequently in Utah and eastern Nevada. It is found as far north as the south slope of the Uinta Mountains in northeastern Utah and as far south as the Paunsaugunt Plateau in extreme southern Utah. The type is most often encountered on the Ashley and Fishlake National Forests where it accounts for 4 percent of the aspen communities. A single stand was seen on the Snake Range in eastern Nevada. This apparently is an intermediate elevation type. All 13 stands examined were between 7,500 and 9,200 ft (2,300 and 2,800 m). Stands were observed on a variety of slopes, exposures, and soils.

**Vegetation**—This is the driest of the three aspen types identified as successional to climax *Pseudotsuga menziesii* forests. The vegetation is characterized by the conspicuous presence of *P. menziesii* along with *Populus tremuloides* in the tree layer, the absence of a tall shrub stratum, and the prominence of *Juniperus communis* in the low shrub layer. A wide variety of other conifers occurred in the type, but *P. menziesii* is characterizing. *Symphoricarpos oreophilus* and *Berberis repens* are frequently abundant members of the low shrub layer. The herbaceous undergrowth is characteristically sparse in cover but highly variable in composition. No single herb appears to typify the type. The most commonly encountered graminoids are *Agropyron trachycaulum*, *Stipa occidentalis*, *Sitanion hysterix*, and *Carex rossii*. The most common forb is *Thalictrum fendleri*. Occasionally, *Astragalus miser*, *Taraxacum officinale*, or *Lathyrus* spp. are abundant. Annuals are infrequent.

**Succession**—The type is recognized as a seral stage within the *P. menziesii* climax forest series and is most closely related to the *P. menziesii/B. repens* and *P. menziesii/S. oreophilus* habitat types described by Mauk and Henderson (1984) for northern Utah and by Youngblood and Mauk (1985) for central and southern Utah. Heavy livestock grazing will tend to suppress the production of *S. oreophilus*, *T. fendleri*, and the palatable grasses and favor the production of *B. repens*, *A. miser*, and *T. officinale*. As the conifer canopy becomes more dense, the undergrowth will become even more depauperate.

**Production**—A single stand was measured for productivity. This limited sample suggests that the potential for production of wood fiber is above average, but the potential for production of livestock forage is well below the average of most aspen communities. Total tree basal area was 192 ft$^2$/acre (44.2 m$^2$/ha), aspen site index was 56 ft (17.0 m), and estimated volume production of aspen wood was 47 ft$^3$/acre/year (3.3 m$^3$/ha/year). As with most of the community types in which *J. communis* is prominent in the undergrowth, total annual herbage production is not great. In the sample stand it was only 295 lb/acre (331 kg/ha), which is in the lowest quartile of all stands sampled. Species composition indicates that this meager amount of undergrowth is of only intermediate value as forage. The value of the type as wildlife habitat is not great because of the lack of structural diversity in the undergrowth.

**Other**—These communities were identified by the same name in the Utah classification (Mueggler and Campbell 1986). They have not been reported to occur outside of the Intermountain Region.

## *Populus tremuloides—Pseudotsuga menziesii/Calamagrostis rubescens* Community Type (POTR-PSME/CARU c.t.)

**Distribution**—This minor, seral community type apparently occurs only in the extreme northern part of the Region. It was observed along the Centennial Range on the Targhee National Forest in eastern Idaho and in the Gros Ventre Range on the Bridger-Teton National Forest in western Wyoming. The type was not encountered either in Utah or Nevada. It is a middle elevation type for this latitude. Sampled stands ranged from 6,400 to 7,800 ft (2,000 to 2,400 m). Most of the stands were on northerly exposures and on a variety of different soils.

**Vegetation**—Composition of the POTR-PSME/CARU c.t. was determined from a sample of seven stands. The type is characterized by the prominence of *Pseudotsuga menziesii* in the dominantly *Populus tremuloides* tree layer, combined with a structurally simple undergrowth of graminoids and forbs. The predominantly herbaceous undergrowth is usually dominated by *Calamagrostis rubescens* but occasionally by *Carex geyeri*. The only other grass that occurs in most stands is *Elymus glaucus*. Although a variety of low-growing forbs are usually present, they are seldom abundant. The most frequent forbs are *Fragaria vesca*, *Geranium viscosissimum*, *Thalictrum fendleri*, *Osmorhiza chilensis*, and *Lupinus argenteus*. Low shrubs, especially *Symphoricarpos* spp., *Rosa woodsii*, and *Berberis repens*, are not unusual but generally are not prominent. Annual plants are scarce.

**Succession**—The type is a seral stage within the *P. menziesii* forest climax series. Comparisons of species constancies (appendix E) suggest a close relationship to the *P. menziesii/C. rubescens* habitat type (Steele and others 1983). Heavy use by cattle would likely reduce the abundance of graminoids and tend to favor increased production of the less palatable forbs such as *F. vesca*, *G. viscosissimum*, and *L. argenteus*. Heavy grazing by sheep would tend to favor production of the graminoids over the more palatable forbs and the few shrubs, especially *S. oreophilus* and *R. woodsii*.

**Production**—The single stand sampled suggests that the type is intermediate in its potential to produce trees and good as summer range for livestock. Total tree basal area, 91 percent of which was aspen, was 169 ft$^2$/acre (38.8 m$^2$/ha). Site index for aspen was 52 ft (15.7 m), and volume production was 41 ft$^3$/acre/year (2.9 m$^3$/ha/year).

Aspen reproduction was fairly good. Undergrowth herbage production was in the upper quartile of all stands, at 1,418 lb/acre (1,590 kg/ha). Most of this consisted of graminoids, 64 percent. Forbs were 35 percent and shrubs only 1 percent. This undergrowth is suitable as livestock forage, with 64 percent of the cover in the desirable category. This forage is better suited for cattle grazing than for sheep. The type has only limited value as wildlife habitat because of the lack of shrubs in the undergrowth and lack of species diversity.

**Other**—Communities of this composition were identified under the same name in the Bridger-Teton National Forest classification (Youngblood and Mueggler 1981) and in the Caribou and Targhee National Forests classification (Mueggler and Campbell 1982).

## *Populus tremuloides—Abies concolor/ Poa pratensis* Community Type (POTR-ABCO/POPR c.t.)

**Distribution**—This minor seral community type was observed only in southern Utah on the Dixie and Fishlake National Forests and in eastern Nevada on the Humboldt National Forest. The type occurs on both the Markagunt Plateau and Tushar Mountains of southern Utah and in the Snake and Schell Creek Ranges of eastern Nevada. All 12 sampled stands grew at elevations between 8,000 and 8,800 ft (2,400 and 2,700 m). Most were on fairly gentle slopes of various exposures and conformations and on soils derived from a wide variety of parent rock.

**Vegetation**—This is one of three types in which *Abies concolor* is prominent in the tree layer along with *Populus tremuloides* and which appears to be successional to *A. concolor* dominance. *Pseudotsuga menziesii* may also be part of the tree component, but it is not prominent. The undergrowth is a fairly depauperate mixture of herbs, primarily grasses. The herb layer generally is dominated by *Poa pratensis*. Other common and sometimes abundant grasses are *Bromus carinatus, Agropyron trachycaulum,* and *Stipa occidentalis*. The most frequent forbs are *Taraxacum officinale, Achillea millefolium,* and *Thalictrum fendleri*. Shrubs may be present in minor amounts, especially *Symphoricarpos oreophilus*, but they are never abundant enough to form a distinct stratum.

**Succession**—The type is a successional stage within the climax *A. concolor* coniferous forest series, but the particular habitat type is uncertain. It also is a grazing-degraded type, judging from the constancy and relative abundance of such species as *P. pratensis* and *T. officinale*. Stands in this type once likely would have been classified as belonging to the POTR-ABCO/SYOR c.t. Abusive grazing undoubtedly reduced the amount of *S. oreophilus* and the grazing sensitive forbs and grasses and permitted an increase in those species able to withstand grazing pressures, such as *P. pratensis* and *T. officinale*.

**Production**—The productivity of this type was not sampled. The undergrowth, however, was generally poor in both production and in species diversity. Therefore, the type is below-average summer range for livestock. The annual production of undergrowth herbage probably ranges between about 400 and 600 lb/acre (450 and 670 kg/ha), most of which is graminoids. Wildlife habitat values are also below average for aspen communities because of the lack of structural diversity of the undergrowth and because of poor overall species diversity.

**Other**—Johnston and Hendzel (1985) recognized the successional status of aspen to *A. concolor* in southern Colorado but did not identify specific community types. In the Utah aspen classification (Mueggler and Campbell 1986), communities of this general composition were placed in the *P. tremuloides—A. concolor/Juniperus communis* c.t.

## *Populus tremuloides—Abies concolor/ Arctostaphylos patula* Community Type (POTR-ABCO/ARPA c.t.)

**Distribution**—This seral aspen type has the most restricted distribution of any described for the Region. It appears to be confined to the Snake Range of the Humboldt National Forest in eastern Nevada. Seven stands in this area were sampled. These stands grew at elevations between 8,300 and 9,500 ft (2,500 and 2,900 m). They occupied moderately steep northerly and easterly slopes, usually at mid-slope positions, and soils derived primarily from quartzites.

**Vegetation**—The vegetation of this seldom seen type is unusual in that it consists of a mixed *Populus tremuloides* and *Abies concolor* tree stratum under which the most abundant plant is the low, distinctive shrub *Arctostaphylos patula* (fig. 33). In about half the seven stands examined, *Pseudotsuga menziesii* was also present in the tree layer or as reproduction. *Berberis repens* is the second most frequent member of the shrub component. The herbaceous stratum is generally sparse but is characterized by the presence of the sedge *Carex rossii*. The next most common graminoid is *Poa fendleriana*. No single forb appears characteristic of this type. The most commonly observed are *Stellaria jamesiana* and *Penstemon watsonii*, which occurred in about half the stands. Annuals appear to be scarce.

**Succession**—This type is primarily a seral stage within the *A. concolor/A. patula* habitat type described by Youngblood and Mauk (1985). The occurrence of *A. patula* in the undergrowth, combined with the presence of *A. concolor*, is distinctive. This again demonstrates the environmental flexibility of aspen serving as a seral species. Those stands that appear successional to *P. menziesii* dominance should be considered seral stages within the *P. menziesii/A. patula* habitat type.

**Production**—This type was not sampled for production, but the undergrowth typically contains few grasses or forbs. Most of the undergrowth production is the evergreen, unpalatable shrub *A. patula*. Probably fewer than 300 lb/acre (336 kg/ha) of herbaceous material is present

Figure 33—The *Populus tremuloides/Arctostaphylus patula* c.t. was observed only in the Snake Range of east-central Nevada. It is an unusual type in that the distinctive evergreen shrub *A. patula* (manzanita) is a prominent component of the rather sparse undergrowth. This is a seral type in which the conifer *A. concolor* will eventually dominate the tree layer.

in most stands. Consequently, the type is poor summer range for livestock. It is also generally poor habitat for wildlife because of the sparse undergrowth and lack of palatable species.

**Other**—Communities in which *A. patula* is undergrowth to a mixed *P. tremuloides—A. concolor* overstory have not been reported previously either in the Intermountain Region or elsewhere.

## *Populus tremuloides—Picea pungens* Cover Type (POTR-PIPU cover type)

**Distribution**—This incidental seral type, scattered intermittently across Utah, ranges from the south slope of the Uinta Mountains in the northeast to the Paunsaugunt Plateau in the south. The type appears most abundant on the Dixie and Fishlake National Forests where it accounts for 4 percent of the aspen communities. It was not seen in either Wyoming, Idaho, or Nevada. The type ranged in elevation from 7,400 ft (2,300 m) in the northern part of Utah to 9,100 ft (2,800 m) in the south. Stands occupied all exposures of moderately steep slopes, in mid- to low-slope positions, and soils derived from both igneous and sedimentary parent materials.

**Vegetation**—This minor cover type was defined to accommodate those aspen stands in which *Picea pungens* is the primary species associated with *Populus tremuloides* in the tree layer and which did not satisfactorily fit other defined types. The diversity of undergrowth vegetation did not permit partitioning beyond the cover type level. The most constant species in the undergrowth of the 15 stands placed in this type is *Juniperus communis*, which occurs in the majority of stands. In general, the shrubby and herbaceous undergrowth is fairly sparse and consists of relatively low-growing species. *Taraxacum officinale* and *Achillia millefolium* were observed in over three-fourths of the stands, whereas *Symphoricarpos oreophilus*, *Bromus anomalus*, *Fragaria vesca*, and *Poa pratensis* were found in almost half the stands.

**Succession**—Apparently the aspen is being slowly replaced by *P. pungens*. As the overhead conifer cover increases in density, the sparse undergrowth will likely become even less productive. Most of the stands in this cover type reflect the results of a rather intense grazing history, judging from the relative prominence of such species as *T. officinale* and *P. pratensis*. Few grazing-susceptible plants remain.

**Production**—This type was not sampled for production. However, certain undergrowth similarities with other types in which *J. communis* is a major undergrowth component suggest that it produces considerably less livestock forage than most aspen communities. Most stands in the type probably produce less than 500 lb/acre (560 kg/ha) of annual growth. It is thus rather poor summer range for livestock. The type is only poor to fair wildlife habitat because of the general lack of hiding cover in the rather sparse undergrowth.

**Other**—Aspen communities successional to *P. pungens* dominance have been reported to occur in Colorado (Johnston and Hendzel 1985). There, they were identified as a seral stage in a *P. pungens/Carex geyeri* habitat type.

## *Populus tremuloides—Pinus flexilis* Cover Type (POTR-PIFL cover type)

**Distribution**—The POTR-PIFL cover type, though seldom seen, is widely scattered across the Region. It occurred as far north as the Gros Ventre Range in western Wyoming, as far south as the Paunsaugunt Plateau in southern Utah, and as far west as the Snake Range in eastern Nevada. The greatest concentration of the type is in eastern Nevada. This is a relatively high elevation type. The only stand encountered below 9,000 ft (2,750 m) was in Wyoming at 8,700 ft (2,650 m). Most stands occurred on fairly steep south-facing slopes and on a variety of soil parent materials.

**Vegetation**—*Pinus flexilis* occurs as a secondary conifer in many of the other aspen community types but never to the extent where it appears to be a potential dominant over other conifer species. A type was needed, however, to accommodate those aspen stands that contain appreciable amounts of only *P. flexilis* and *Populus tremuloides* in the tree strata. Nine such stands were encountered. Further partitioning of this cover type into different community types does not appear warranted. No single undergrowth species occurred in all nine stands. However, more than two-thirds of the stands contained *Symphoricarpos oreophilus*, *Berberis repens*, *Carex rossii*, *Agropyron trachycaulum*, *Achillea millefolium*, *Trifolium gymnocarpum*, *Stellaria jamesiana*, and *Penstemon watsonii*. Over half the stands contained substantial amounts of *Juniperus communis* and *Poa fendleriana*. Annual plants were few.

**Succession**—Whether *P. flexilis* will ever become dense enough in these stands to completely suppress the aspen is questionable. However, for the sake of consistency, the cover type is considered a seral type leading to a *P. flexilis*-dominated coniferous forest climax type.

**Production**—Although not sampled for production, the undergrowth in this type appears to be fairly sparse and probably ranks within the lower quartile of all aspen stands, generally producing less than 400 lb/acre (448 kg/ha) of air-dry herbage. The type would thus be poor summer range for livestock, especially considering the relatively low palatability of many of the undergrowth components. The value of the type as wildlife habitat would probably be low to moderate considering the limited diversity of vegetation structure and amount of forage.

**Other**—Johnston and Hendzel (1985) observed that aspen can be a seral species in *P. flexilis* stands in Colorado, but they indicated that the association of these two species is somewhat unusual. They believe that this seral community occurs in the *P. flexilis*/*J. communis* habitat type.

## *Populus tremuloides—Pinus ponderosa* Cover Type (POTR-PIPO cover type)

**Distribution**—This infrequent seral type was observed at two principal locations: the south slope of the Uinta Mountains in northeastern Utah, and the mountains and high plateaus of extreme southern Utah. An area of concentration appeared to be the Markagunt Plateau of the Dixie National Forest. In fact, this type accounted for 8 percent of the aspen communities on the Dixie. Interestingly, it occupied the same elevation regardless of whether it was in northern or southern Utah; 15 of the 18 sampled stands were between 8,000 and 8,900 ft (2,400 and 2,700 m). Almost all these stands were on gentle, less than 20 percent slopes of a variety of exposures. They equally occupied soils derived from igneous and sedimentary parent rock.

**Vegetation**—This minor cover type is designated to accommodate those aspen communities in which *Pinus ponderosa* is the prominent conifer associated with *Populus tremuloides* (fig. 34). This conifer occurs in other types, but only secondarily to other conifers that appear better adapted to the site and more shade tolerant than *P. ponderosa*. As one would expect, the undergrowth in the POTR-PIPO cover type is relatively sparse and consists of species adapted to fairly dry environments. Further partitioning into community types does not appear justified. No single undergrowth species occurred in all 18 stands examined. In fact, only *Juniperous communis* occurred in more than two-thirds of the stands, and only half the stands contained the next most common species: *Symphoricarpos oreophilus*, *Berberis repens*, *Poa fendleriana*, *Taraxacum officinale*, and *Achillea millefolium*. Annuals are generally scarce.

**Succession**—The *P. tremuloides* in the tree cover appears susceptible to slow replacement by *P. ponderosa*. Even though *P. ponderosa* tends to grow in fairly open stands, the increase in competition (probably primarily from shading) apparently is sufficient to prevent aspen reproduction. Consequently, those stands that contain *P. ponderosa* reproduction eventually will become dominated by this conifer. The generally sparse undergrowth is unlikely to change appreciably as the overstory changes from aspen dominance to conifer dominance.

**Production**—Production on the POTR-PIPO cover type was sampled on three stands. The type is moderately productive of wood fiber. Total tree basal area averaged 160 $ft^2$/acre (36.8 $m^2$/ha), of which 72 percent was aspen. Site index at 80 years for aspen was 46 ft (13.9 m), and estimated volume growth was 33 $ft^3$/acre/year (2.3 $m^3$/ha/year). All of these measurements ranked in the mid-third percentile of all aspen stands. Aspen reproduction averaged 735 suckers/acre (824/ha), and established seedlings of *P. ponderosa* averaged 197 seedlings/acre (487/ha). The number of aspen trees averaged a moderate 735 stems/acre (824/ha). Despite the current dominance by aspen, the established conifer seedlings indicate that *P. ponderosa* will eventually gain dominance.

The undergrowth consisted of a fairly balanced mixture of graminoids at 39 percent, forbs at 38 percent, and shrubs at 23 percent. This undergrowth was classified as high in forage suitability; 58 percent was desirable and 39 percent intermediate. This minor seral type, therefore, is moderate to good summer range for livestock. In contrast to most of the other seral types, succession to conifer dominance is unlikely to depress undergrowth production

Figure 34—In a few areas of the Intermountain Region, aspen appears to be a seral species in communities that eventually will be dominated by *Pinus ponderosa.* These situations, encountered primarily on the Markagunt Plateau in southern Utah and on the south slope of the Uinta Mountains in northeastern Utah, are designated the *Populus tremuloides-P. ponderosa* cover type.

greatly. The type is only mediocre wildlife habitat because of the general lack of structural diversity in the undergrowth.

**Other**—In the Utah aspen classification (Mueggler and Campbell 1986), both a *P. tremuloides—P. ponderosa / Quercus gambelii* and a *P. tremuloides—P. ponderosa / J. communis* c.t were identified, but the validity of this separation was uncertain. I have since decided to combine these communities where aspen is associated with *P. ponderosa* into a single cover type. The association of aspen with *P. ponderosa* was noted in Colorado by Johnston and Hendzel (1985), who considered their stands to be seral stages in the *P. ponderosa / Q. gambelii—S. oreophilus* habitat type.

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# APPENDIX A: DETAILS OF STUDY METHODS

The development of a classification for the aspen forests of the Intermountain Region occurred in phases over approximately 8 years. Following an initial period of gaining familiarity with the broad variability in composition of aspen-dominated forests and the compositional complexities created by environment, natural succession, and often severe grazing disturbance, I adopted a conceptual approach to the development of a classification of these communities and devised preliminary sampling and analysis techniques.

A major decision at the outset was to use the "community type" rather than "habitat type" concept of classification development. This was necessitated by the uncertain successional status of the majority of the aspen communities and recognition of probable grazing alterations of this historically important summer forested range for sheep and cattle. Habitat types, as conceptualized by Daubenmire and Daubenmire (1968), are aggregations of land units capable of supporting similar climax plant communities. Habitat types are initially defined by differences in species composition of climax communities, and thus require ample representation of little-disturbed climax communities upon which to base type separations. Community types, on the other hand, are aggregations of similar plant communities based on existing vegetation composition, regardless of successional status or alteration caused by excessive grazing. As with habitat types, community types use the vegetation as an environmental integrator and thus, it is hoped, reflect major environmental differences. Unlike habitat types, however, community types also reflect vegetation composition differences caused by seral sequences and biotic pressures. Community types may thus represent either climax plant associations or successional stages leading toward climax plant associations or grazing-altered communities within climax plant associations. In any event, resource managers in the field must be able to recognize and contend with this existing vegetation. Once community types are defined, efforts can be directed toward establishing successional relationships and linking the seral types to known habitat types.

Collection of data began on the Bridger-Teton National Forest in western Wyoming the summer of 1978. Youngblood and Mueggler (1981) then analyzed these data and developed a preliminary classification with community type descriptions specific to this area. This was followed by Mueggler and Campbell's (1982) work on the Caribou and Targhee National Forests in southeastern Idaho in 1979 and the development of a preliminary classification and description of community types specific to these two Forests. Aspen stands on the National Forests in northern Utah were inventoried in 1980 and 1981 and in southern Utah in 1981 and 1982. A preliminary classification of aspen community types and type descriptions were then developed for Utah (Mueggler and Campbell 1986). In the summer of 1984 field studies were concentrated on the Humboldt and Toiyabe National Forests of Nevada. During the course of the study, only minor changes were made in sampling procedures to meet data needs not recognized initially. In addition, I used stand composition data related to separate studies on aspen to conifer succession furnished by cooperators, when these data were reliable and in suitable form. Less than 10 percent of the total data base was obtained from these other studies.

The preliminary classifications for the four geographical areas (western Wyoming, southeastern Idaho, Utah, and Nevada) were developed more-or-less independently from independent data sets rather than by extension from one area to the next. Also, my concepts of the importance of community structure and the indicator significance of certain undergrowth species to classification development changed as my understanding of community variability and succession improved during the course of the overall study. It thus became essential to analyze the composite data set as a whole and to develop a unified classification for the Intermountain Region incorporating my improved understanding of aspen community relations.

## Field Methods

We required a large number of sample plots to adequately encompass and replicate the variation in the seral and stable aspen communities found within the Intermountain Region. Data on composition of the overstory and undergrowth vegetation were needed for development of the actual classification. At the same time we needed to acquire data on stand structure, productivity, and environment to serve as a basis for describing productivity and environmental factors of the subsequently defined community types. However, acquiring quantitative data on stand structure, undergrowth productivity, and certain other desired factors can be laborious and severely restricts the number of stands that can be examined when resources are limited. Our inability to measure all stands at the desired intensity and still acquire the large number of stands needed to serve as a basis for a reliable classification became apparent during the first year in western Wyoming where all stands were sampled at the same intensity. In subsequent years, a dual sampling approach was used consisting of both general reconnaissance and intensively sampled plots, except in Nevada where time did not permit intensive sampling. One person sampled the reconnaissance plots, working independently from a two-person crew responsible for sampling the more time-consuming intensive plots. On the reconnaissance plots, species composition was estimated, and some environmental factors were characterized. The intensive plots yielded data on stand structure, age, productivity, and environment, as well as on species composition.

Sampling was concentrated in those areas of the Region where aspen formed a conspicuous part of the overall vegetation complex. (However, time did not permit the inclusion of the Sawtooth and Challis National Forests in south-central Idaho even though these two forests contain considerable amounts of aspen.) The usual method of locating aspen communities for sampling was to travel forest roads looking for reasonably accessible candidate stands. Only two criteria were used for stand selection:

at least 50 percent of the tree canopy cover had to consist of aspen, and the stand needed to be large enough to contain a single macroplot within an apparently uniform environment. Our intent was to sample the full environmental range where aspen expressed dominance. Neither successional status nor grazing influences were considerations in stand selection. Therefore, even though the actual selection of stands for sampling was subjective, the method of selection avoided preconceived bias that could affect the resulting classification.

Intensive sampling of the Idaho and Utah stands centered upon a single 1/13-acre (314-$m^2$) circular macroplot established in a relatively uniform and representative portion of the stand. Ecotones at stand margins and atypical openings were avoided, as were clonal ecotones where a stand had more than one discernible aspen clone. The following tree data by species were collected on each macroplot: an ocular estimate of overhead canopy cover; reproduction as number of stems with heights less than 4 inches (1 dc), 4 to 12 inches (1 to 3 dc), and 12 to 55 inches (3 to 14 dc); number of stems by 2-inch (5-cm) diameter at breast height (d.b.h.) size classes; and age, height, and d.b.h. of individual trees selected to represent the dominants. (Tree data from the Wyoming stands were not collected in the same manner as from Idaho and Utah and therefore are not included in the tree production summaries.)

We determined species composition of the undergrowth shrubs and herbs by estimating canopy cover by species from a careful examination of the entire macroplot. We also estimated canopy cover for the vegetation classes of shrubs, graminoids, forbs, and annuals. Undergrowth biomass was determined by a combination of estimating and clipping current year's growth of shrubs below 5 ft (1.5 m) high and herbs on three sets of microplots randomly distributed on the macroplot. Each set of microplots consisted of a cluster of five circular 5.4-$ft^2$ (0.5-$m^2$) plots on which the current growth on four was estimated as a percentage of the fifth, which was then clipped. The clipped material was saved and later dried for 48 h at 158 °F (70 °C). The percentage figures from the four estimated plots were then converted to dry weight. An estimated correction was applied at the time of sampling to adjust the weights for sampling either before or after the time of peak standing crop, and to correct for obvious livestock use. Although they were highly subjective, we considered these adjustments necessary to compensate for obvious production distortions caused by time of sampling use. Therefore, undergrowth production data are based on 15 microplots per stand.

The following environmental factors were determined for each intensively sampled stand: elevation, aspect, percent slope, landform, soil parent material, depth of melanized layer, and estimates of rooting depth, soil rockiness, and soil texture. Also recorded were location, evidence of succession, livestock use, and other interpretive information.

The considerably more rapid reconnaissance technique of sampling consisted of choosing approximately 1/10 acre (1/25 ha) of uniform portion of the stand to be sampled and estimating selected vegetation characteristics. Canopy cover of each tree species was estimated separately for that portion over 4.6 ft (1.4 m) high and the reproduction under this height. Percentage canopy cover for each shrub and herbaceous species, as well as for vegetation classes, was estimated after carefully examining the sample area. Elevation, aspect, landform, soil parent material, and stand location were recorded, as were interpretive information related to succession and animal use.

In this manner we accumulated data from 2,137 stands (or from similar separate studies) to serve as a basis for developing a community type classification for aspenlands in the Intermountain Region. Almost a fourth of these stands were sampled intensively and the remainder by general reconnaissance.

No single flora adequately described all of the plant species encountered throughout the Intermountain Region. Elements from at least three major floristic provinces exist. Species from the Northern Rocky Mountains extend into eastern Idaho and western Wyoming. Southern Rocky Mountain species extend into eastern Utah. The remainder of Utah and Nevada are primarily within the Great Basin floristic province (Cronquist and others 1972). Nomenclature relied heavily upon Hitchcock and Cronquist (1973) for the northern part of the Region, and upon Harrington (1954), Welsh and Moore (1973), and Cronquist and others (1972, 1977, 1984) for the remainder of the Region. Of the over 550 plant species evaluated during the course of this study, only 184 of the more important are included in the tables showing vegetation composition by community types (appendix F).

## Analysis Methods

Before placing the field data on computer file for analysis, we confirmed the identification of all voucher plant specimens and identified all questionable species. The difficulty in separating certain immature species and nomenclature ambiguities of others was resolved by combining the species in question. Frequent lack of flowers or mature fruit required treating both *Osmorhiza chilensis* and *Osmorhiza depauperata* as *O. chilensis*, and *Rosa woodsii* and *Rosa nutkana* as *R. woodsii*. Other species, though separately identified in the field, were combined in the summaries for convenience because of their similarities. These are: *Sambucus racemosa* and *Sambucus cerulea* as *S. racemosa; Festuca idahoensis* and *Festuca ovina* as *F. idahoensis; Delphinium occidentale* and *Delphinium barbeyi* as *D. occidentale; Fragaria vesca* and *Fragaria virginiana* as *F. vesca; Mertensia arizonica, Mertensia ciliata,* and *Mertensia franciscana* as *M. arizonica; Polemonium foliosissimum* and *Polemonium occidentale* as *P. foliosissimum*; and *Senecio serra* and *Senecio triangularis* as *S. serra*.

Nomenclature ambiguities forced a somewhat arbitrary selection of names for some species. Thus, the *Agropyron trachycaulum-Agropyron subsecundum-Agropyron caninum* complex is treated as *A.trachycaulum; Bromus* *marginatus* and *Bromus polyanthus* are included with *Bromus carinatus*; and *Stipa columbiana* and *Stipa nelsonii* are lumped with *Stipa occidentalis*.

The traditional name of *Koeleria cristata* is used to include *Koeleria nitida*. Considerable confusion revolved around the separation of *Geranium viscosissimum* and *Geranium fremontii*. This confusion is reflected by different floras in adjacent States that seldom treat both species and that may indicate that *G. fremontii* is synonymous with *G. viscosissimum*. I have arbitrarily chosen to call this uncertain, pink-flowered complex *G. viscosissimum*. In the listing of species composition by community types in appendix F, species names representing the above combinations are followed by "+."

All vegetation and environmental data were subsequently coded, entered into computer files, and then checked for errors. Before beginning the process of evaluating the data for determining community relationships, every tenth stand was deleted from the file to serve as an unbiased validation of the resulting classification and of the field key that would serve to assist in type identification. These validation stands were subsequently reintroduced into the data file for compilation of all tables summarizing the community type data.

Development of the classification relied principally on the use of synthesis or association tables (Mueller-Dombois and Ellenberg 1974). The synthesis table method permitted subjective recognition of similarities in vegetation structure and in species' fidelity, constancy, and coverage. Certain species appeared to be indicative of natural succession, environment, and grazing degradation. Other species strongly affected vegetation structure. Numerous reiterations of stand alignments permitted sequencing according to visual similarities of these important species. (Earlier attempts to classify the Idaho aspen stands by using cluster analysis of vegetation similarity indices failed to produce grouping sensible for management [Mueggler and Campbell 1982]. In the computation of similarity indices, the great variation in presence and cover of the many minor species apparently overshadowed the relatively few species that exert a dominant role as expressed by life form and amount of cover and that, I believe, should be stressed in the development of a meaningful classification.)

Stands were grouped into community types according to the constancy and abundance of the selected indicator species. Similarity of vegetation structure was a prime consideration in forming the groups. The presence or absence of substantial amounts of conifers in the overstory, or potentially so as judged by conifer regeneration, was the first separation criterion. These were categorized as aspen-conifer cover types. The presence of substantial amounts of conifers was considered highly relevant because of successional implications. In the normal course of succession, all such mixed cover types will probably succeed to coniferous forest climax communities. The presence of a tall shrub layer and of a low shrub layer were second and third criteria considered in grouping stands. These shrub layers not only tend to reflect environmental differences but are also highly relevant to management. Herbaceous layer indicator species are those considered to be sensitive indicators of abiotic environmental extremes and those sensitive to severe vegetational alterations caused by prolonged excessive grazing. Thus, species prevalence within the tree, shrub, and herb life form classes were used to delineate and characterize the aspen community types.

After grouping the stands into what appeared to be sensible community types, a dichotomous key based on characterizing species was prepared and then checked against all stands that were used to develop the classification. This key was developed to facilitate field use of the classification. The key was then used to classify the validation stands into community types; the species compositions of these were then compared to that of the original groups forming the classification and changes incorporated where necessary. Of the original stands used to develop the classification, 6 percent could not readily be placed into identifiable community types. Similarly, 6 percent of the validation stands did not fit the classification. These undetermined stands are likely either unusual isolated communities or represent ill-defined community types reflecting unusual environmental or disturbance situations.

Because the ability to judge the successional status of the aspen community types is important, I have attempted to clarify this status by linking the community types to coniferous forest habitat types previously identified in the Intermountain Region (Mauk and Henderson 1984; Steele and others 1983; Youngblood and Mauk 1985) and to climax aspen community types identified by the current study. An objective index to probable successional relationships was arrived at by comparing constancy values of species in obviously seral aspen types with those in coniferous forest habitat types. The premise was that species with high constancy in a climax type are more likely to have high constancy in a related successional stage of that type than they are in an unrelated stage. To reduce the level of "noise species," only those species that had at least 50 percent constancy in the given climax type (habitat type) were used in the comparisons. Furthermore, to increase the effect on the index of those species with high constancy (indicator species?) in the climax type, the values for species with 80 percent or greater constancy in the climax type were double-weighted. Sorensen's index of similarity (SI=2w/A+B) (Mueller-Dombois and Ellenberg 1974), where "0" indicates no relationship and "1" identical relationship, was used in these comparisons. These indices (appendix E) were computed for all successional and climax types that might be related. The linkages between aspen community types and coniferous forest habitat types, as discussed in the type descriptions, are based on these similarity indices combined with subjectively evaluating the composition of the vegetation characterizing the types, using knowledge of probable changes attributable to succession or grazing, and comparing environmental similarities where possible. At best, the linkages are only suggestive and will require intensive separate study for confirmation of the relationships.

Site index at 80 years was determined on each of the intensively sampled stands from curves developed by Edminster and others (1985) for the Central Rocky Mountains. An estimate of potential aspen volume productivity on each intensively sampled site was determined from site index using the relationship developed by Mowrer (1986); production was expressed as total volume increment per year at stand maturity. Site index and volume increment were summarized by community type and are shown in appendix I.

An approximation of undergrowth suitability as livestock forage was based on forage suitability ratings developed for Intermountain Region species by USDA Forest Service (1981). The proportion of total canopy cover composed of species in each of three suitability classes (desirable, intermediate, least) is considered an index to the value of the undergrowth as livestock forage. This was computed for each community type by summing the constancy times the cover data (appendix K) for each species within each suitability class and dividing by the summation of constancy times cover for all classes to give the relative percentage of vegetation within each class.

## APPENDIX B: MAJOR (MA), MINOR (MI), AND INCIDENTAL (I) ASPEN COMMUNITY TYPES IN THE INTERMOUNTAIN REGION BY OVERSTORY COVER TYPES. THE COMMUNITY TYPE ACRONYM REFLECTS BOTH THE OVERSTORY AND UNDERGROWTH: KEY OVERSTORY SPECIES/SHRUB SPECIES/HERBACEOUS SPECIES

| Undergrowth category | | | Overstory cover type | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Tall shrub | Low shrub | Herb | POTR | POTR-ABLA | POTR-PICO | POTR-PSME | POTR-ABCO | POTR-PIPU | POTR-PIFL | POTR-PIPO |
| (undetermined) | | | | | | | | I | I | I |
| SASC | - | - | I | | | | | | | |
| AMAL | - | - | | I | | I | | | | |
| AMAL | - | T.F. | MA | | | | | | | |
| AMAL | - | THFE | MI | | | | | | | |
| AMAL | - | PTAQ | I | | | | | | | |
| AMAL | SYOR | T.F. | MA | | | | | | | |
| AMAL | SYOR | THFE | MA | | | | | | | |
| AMAL | SYOR | CARU | MA | | | | | | | |
| AMAL | SYOR | BRCA | MI | | | | | | | |
| | SYOR | - | | | I | I | I | | | |
| | SYOR | T.F. | MA | MI | | | | | | |
| | SYOR | THFE | MA | I | | | | | | |
| | SYOR | CARU | MA | | | | | | | |
| | SYOR | CARO | I | | | | | | | |
| | SYOR | BRCA | MA | I | | | | | | |
| | SYOR | POPR | MI | | | | | | | |
| | SYOR | FETH | I | | | | | | | |
| | SYOR | WYAM | I | | | | | | | |
| | JUCO | - | | MI | MI | MI | | | | |
| | JUCO | CAGE | MI | | | | | | | |
| | JUCO | LUAR | I | | | | | | | |
| | JUCO | ASMI | I | | | | | | | |
| | ARTR | - | MI | | | | | | | |
| | ARPA | - | | | | | I | | | |
| | SHCA | - | I | I | | | | | | |
| | RUPA | - | I | | | | | | | |
| | SARA | - | I | | | | | | | |
| | | T.F. | MA | MA | | | | | | |
| | | THFE | MA | MI | I | | | | | |
| | | CARU | MA | | | I | | | | |
| | | CARO | MA | MA | | | | | | |
| | | CAGE | | I | I | | | | | |
| | | BRCA | MA | | | | | | | |
| | | POPR | MI | | | | I | | | |
| | | FETH | I | | | | | | | |
| | | STCO | I | | | | | | | |
| | | ASMI | I | | | | | | | |
| | | WYAM | MI | | | | | | | |
| | | PTAQ | I | | | | | | | |
| | | VECA | I | | | | | | | |

# APPENDIX C: PROPORTION OF ASPEN STANDS SAMPLED ON EACH NATIONAL FOREST THAT WAS CLASSIFIED IN VARIOUS TYPES

| Community types (No. of stands classified:) | Bridger-Teton (165) | Targhee (157) | Caribou (183) | Wasatch-Cache (387) | Ashley (114) | Uinta (236) | Manti-LaSal (138) | Fishlake (109) | Dixie (143) | Humboldt (324) | Toiyabe (57) | All Forests (2,013) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | National Forests | | | | | | | | | | | |
| | Percent | | | | | | | | | | | |
| POTR/VECA | 0 | 0 | 0 | 1 | 0 | T[1] | 0 | 0 | 0 | 1 | 0 | T |
| POTR/PTAQ | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 |
| POTR/WYAM | 3 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 1 |
| POTR/FETH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 8 | 0 | 0 | 1 |
| POTR/TALL FORB | 15 | 1 | 5 | 14 | 1 | 21 | 15 | 6 | 2 | 18 | 0 | 11 |
| POTR/CARU | 12 | 18 | 10 | 1 | 7 | 2 | 4 | 2 | 0 | 0 | 0 | 4 |
| POTR/THFE | 18 | 4 | 1 | 3 | 1 | 1 | 7 | 2 | 1 | 8 | 0 | 5 |
| POTR/BRCA | 1 | 1 | 1 | 5 | 1 | 4 | 4 | 3 | 3 | 8 | 5 | 4 |
| POTR/CARO | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | 10 | T | 54 | 3 |
| POTR/STCO | 0 | 1 | 0 | T | 2 | 0 | 0 | 1 | 7 | 0 | 0 | 1 |
| POTR/ASMI | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 1 |
| POTR/POPR | 0 | 0 | 1 | 1 | 4 | 0 | 3 | 2 | 3 | 1 | 0 | 1 |
| POTR/RUPA | 1 | 0 | 1 | T | 0 | T | 0 | 0 | 0 | 0 | 0 | T |
| POTR/SARA | 0 | 0 | 0 | T | 0 | 2 | 4 | 0 | 0 | 0 | 0 | 1 |
| POTR/SHCA | 4 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| POTR/SYOR/ TALL FORB | 2 | 3 | 10 | 12 | 0 | 27 | 12 | 6 | 0 | 13 | 2 | 10 |
| POTR/SYOR/CARU | 7 | 17 | 11 | T | 5 | 4 | 9 | 0 | 0 | T | 0 | 4 |
| POTR/SYOR/THFE | 3 | 3 | 9 | 4 | 4 | 2 | 4 | 1 | 0 | 7 | 0 | 4 |
| POTR/SYOR/FETH | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0T | |
| POTR/SYOR/CARO | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1 | 0 | 9 | 1 |
| POTR/SYOR/WYAM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | T |
| POTR/SYOR/BRCA | 0 | 0 | 1 | 4 | 8 | 3 | 4 | 4 | 1 | 4 | 16 | 3 |
| POTR/SYOR/POPR | 0 | 0 | 0 | 2 | 1 | 1 | 8 | 1 | 7 | T | 0 | 2 |
| POTR/JUCO/CAGE | 0 | 0 | 1 | T | 18 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| POTR/JUCO/LUAR | 1 | 0 | 0 | 1 | 5 | 0 | 0 | 4 | 0 | 0 | 0 | 1 |
| POTR/JUCO/ASMI | 0 | 0 | 0 | 2 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| POTR/ARTR | 2 | 0 | 0 | 3 | 3 | 1 | 0 | 1 | 0 | 1 | 12 | 1 |
| POTR/SASC | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 |
| POTR/AMAL-SYOR/ TALL FORB | 1 | 4 | 7 | 10 | 0 | 7 | 2 | 1 | 0 | 5 | 2 | 5 |
| POTR/AMAL-SYOR/ THFE | 1 | 5 | 6 | 2 | 1 | 3 | 0 | 1 | 0 | 2 | 0 | 2 |
| POTR/AMAL-SYOR/ CARU | 2 | 22 | 15 | 1 | 0 | T | 0 | 0 | 0 | 0 | 0 | 3 |
| POTR/AMAL-SYOR/ BRCA | 0 | 1 | 1 | 2 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 1 |
| POTR/AMAL/PTAQ | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| POTR/AMAL/TALL FORB | 0 | 2 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 7 | 0 | 2 |
| POTR/AMAL/THFE | 0 | 1 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 1 |
| POTR-ABLA/SHCA | 5 | 0 | 1 | T | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| POTR-ABLA/AMAL | 0 | 0 | 1 | 2 | 0 | T | 1 | 0 | 0 | 0 | 0 | T |
| POTR-ABLA/SYOR/ TALL FORB | 1 | 0 | 1 | 3 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 1 |
| POTR-ABLA/SYOR/ THFE | 1 | 0 | 2 | 1 | 1 | T | 1 | 1 | 1 | T | 0 | 1 |
| POTR-ABLA/SYOR/ BRCA | 0 | 0 | 0 | 1 | 3 | T | 1 | 0 | 1 | 0 | 0 | 1 |
| POTR-ABLA/JUCO | 0 | 0 | 0 | | | | | | | | | |
| POTR-ABLA/TAL | 0 | 2 | 3 | 0 | 2 | 3 | 1 | 1 | 1 | 0 | 2 | |
| POTR-ABLA/CAGE | 1 | 0 | 1 | 1 | 3 | 0 | 4 | 0 | 0 | 0 | 0 | 1 |
| POTR-ABLA/CARO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 20 | 1 | 0 | 2 |
| POTR-PICO/SYOR | 0 | 3 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| POTR-PICO/JUCO | 1 | 0 | 0 | 3 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

(con.)

## APPENDIX C (Con.)

| Community types (No. of stands classified:) | National Forests | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bridger-Teton (165) | Targhee (157) | Caribou (183) | Wasatch-Cache (387) | Ashley (114) | Uinta (236) | Manti-LaSal (138) | Fishlake (109) | Dixie (143) | Humboldt (324) | Toiyabe (57) | All Forests (2,013) |
| | *Percent* | | | | | | | | | | | |
| POTR-PICO/THFE | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | T |
| POTR-PICO/CAGE | 0 | 4 | 0 | 2 | 4 | T | 0 | 0 | 0 | 0 | 0 | 1 |
| POTR-PSME/AMAL | 1 | 4 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| POTR-PSME/SYOR | 1 | 1 | 3 | 1 | 1 | T | 0 | 0 | 1 | 0 | 0 | 1 |
| POTR-PSME/JUCO | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 | 2 | T | 0 | 1 |
| POTR-PSME/CARU | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | T |
| POTR-ABCO/SYOR | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 6 | 1 | 3 | 0 | 2 |
| POTR-ABCO/ARPA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 |
| POTR-ABCO/POPR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 1 |
| POTR-PIPU | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 4 | 4 | 0 | 0 | 1 |
| POTR-PIFL | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | T |
| POTR-PIPO | 0 | 0 | 0 | 0 | 3 | 0 | 2 | 0 | 8 | 0 | 0 | 1 |

[1]T = less than 0.5 percent.

## APPENDIX D: RELATIONSHIP OF THE PREVIOUS ASPEN CLASSIFICATIONS FOR PARTS OF THE INTERMOUNTAIN REGION TO THE CURRENT COMPREHENSIVE CLASSIFICATION THAT SUPERCEDES THEM

| Intermountain Region aspen classification | Utah classification (Mueggler and Campbell 1986) | Caribou and Targhee classification (Mueggler and Campbell 1982) | Bridger-Teton classification (Youngblood and Mueggler 1981) |
|---|---|---|---|
| **MAJOR COMMUNITY TYPES:** | | | |
| POTR/TALL FORB | POTR/SESE<br>POTR/HELA | POTR/RUOC | POTR/RUOC<br>POTR/HELA<br>POTR/LIFI |
| POTR/SYOR/TALL FORB | POTR/SYOR/SESE | POTR/SYOR-RUOC | POTR/SYOR (in part) |
| POTR/AMAL-SYOR/ TALL FORB | POTR/PRVI/SESE (major part) | POTR/AMAL-SYOR (minor part) | |
| POTR-ABLA/TALL FORB | POTR-ABLA/SESE | | POTR-ABLA/RUOC<br>POTR-ABLA/LIFI<br>POTR-ABLA/ARCO (minor part) |
| POTR/CARU | POTR/CAGE (in part)<br>POTR/CARU-POPR | POTR/CARU | POTR/CARU |
| POTR/SYOR/CARU | POTR/SYOR/CAGE (in part) | POTR/SYOR-CARU<br>POTR/PAMY-CARU<br>POTR/SPBE-CARU | POTR/SPBE (minor part) |
| POTR/AMAL-SYOR/CARU | POTR/PRVI/CAGE (major part) | POTR/AMAL-SYOR (major part)<br>POTR/AMAL-PAMY<br>POTR/AMAL-SPBE | POTR/PRVI (major part)<br>POTR/SPBE (major part) |
| POTR/THFE | | POTR/GEVI<br>POTR/POPR (major part) | POTR/THFE<br>POTR/BERE (major part)<br>POTR/ARCO (minor part)<br>POTR/ASMI (minor part) |
| POTR/SYOR/THFE | POTR/SYOR/CAGE (minor part) | POTR/SYOR-POPR<br>POTR/PAMY-GEVE | POTR/SYOR (in part)<br>POTR/ARCO (in part)<br>POTR/ASMI (in part) |
| POTR/AMAL-SYOR/THFE | | | |
| POTR/CARO | POTR/CAGE (minor part) | | |
| POTR-ABLA/CARO | POTR-ABLA/CAGE (major part) | | |
| POTR/BRCA | POTR/BRCA | POTR/POPR (minor part) | |
| POTR/SYOR/BRCA | POTR/SYOR/BRCA | | |
| **MINOR COMMUNITY TYPES:** | | | |
| POTR/WYAM | | POTR/WYAM | POTR/WYAM |
| POTR/ARTR | POTR/JUCO/SIHY (in part) | POTR/ARTR-FEID | POTR/ARTR |
| POTR/JUCO/CAGE | POTR/JUCO/CAGE (major part) | | |
| POTR/POPR | POTR/POPR | POTR/POPR (minor part) | |
| POTR/SYOR/POPR | POTR/SYOR/POPR | POTR/SYOR-POPR | |
| POTR/AMAL/THFE | POTR/PRVI/CAGE (minor part) | POTR/AMAL-CARU (major part) | POTR/PRVI (minor part) |
| POTR/AMAL/TALL FORB | POTR/PRVI/SESE (minor part) | POTR/AMAL-CARU (minor part) | |
| POTR/AMAL-SYOR/BRCA | | | |
| POTR-ABLA/SYOR/ TALL FORB | POTR-ABLA/SYOR/SESE | POTR-ABLA/SYOR (in part) | |
| POTR-ABLA/THFE | | POTR-ABLA/THFE | POTR-ABLA/ARCO (in part)<br>POTR-ABLA/BERE (in part) |
| POTR-PICO/JUCO | POTR-PICO/JUCO | | |
| POTR-ABCO/SYOR | POTR-ABCO/SYOR | | |

(con.)

## APPENDIX D (Con.)

| Intermountain Region aspen classification | Utah classification (Mueggler and Campbell 1986) | Caribou and Targhee classification (Mueggler and Campbell 1982) | Bridger-Teton classification (Youngblood and Mueggler 1981) |
|---|---|---|---|
| INCIDENTAL COMMUNITY TYPES: | | | |
| POTR/VECA | POTR/VECA | | |
| POTR/RUPA | | | |
| POTR/SARA | POTR/SARA | | |
| POTR/SASC | | | |
| POTR/PTAQ | POTR/PTAQ | | |
| POTR/AMAL/PTAQ | POTR/ACGR/PTAQ | | |
| POTR/FETH | POTR/FETH | | |
| POTR/SYOR/FETH | POTR/SYOR/FETH | | |
| POTR/SYOR/CARO | POTR/SYOR/CAGE (minor part) | | |
| POTR/SYOR/WYAM | | | |
| POTR/ASMI | POTR/CAGE (minor part)<br>POTR/JUCO/ASMI (in part) | | POTR/ASMI (minor part) |
| POTR/JUCO/ASMI | POTR/JUCO/ASMI (in part)<br>POTR/JUCO/CAGE (minor part) | | |
| POTR/JUCO/LUAR | POTR/JUCO/SIHY (in part)<br>POTR/JUCO/CAGE (minor part) | | |
| POTR/STCO | POTR/SIHY | | |
| POTR/SHCA | | | POTR/SHCA<br>POTR/JUCO |
| POTR-ABLA/SHCA | | | POTR-ABLA/SHCA<br>POTR-ABLA/BERE (in part) |
| POTR-ABLA/AMAL | POTR-ABLA/AMAL | | POTR-ABLA/PRVI |
| POTR-ABLA/SYOR/BRCA | | | |
| POTR-ABLA/SYOR/THFE | POTR-ABLA/SYOR/CAGE (major part) | POTR-ABLA/SYOR (in part) | POTR-ABLA/BERE (in part) |
| POTR-ABLA/JUCO | POTR-ABLA/JUCO | | |
| POTR-ABLA/CAGE | POTR-ABLA/CAGE (minor part) | | |
| POTR-PICO/SYOR | | POTR-PICO/CARU (in part) | |
| POTR-PICO/THFE | | | |
| POTR-PICO/CAGE | POTR-PICO/VASC | POTR-PICO/CARU (in part) | |
| POTR-PSME/AMAL | POTR-PSME/AMAL | POTR-PSME/AMAL | POTR-PSME/SPBE |
| POTR-PSME/SYOR | | POTR-PSME/SYOR | POTR-PSME/CARU (minor part) |
| POTR-PSME/JUCO | POTR-PSME/JUCO | | |
| POTR-PSME/CARU | | POTR-PSME/CARU | POTR-PSME/CARU (major part) |
| POTR-ABCO/POPR | POTR-ABCO/JUCO | | |
| POTR-ABCO/ARPA | | | |
| POTR-PIPU | | | |
| POTR-PIFL | | | |
| POTR-PIPO | POTR-PIPO/QUGA<br>POTR-PIPO/JUCO | | |

# APPENDIX E1: SIMILARITY INDICES[1] BETWEEN SERAL ASPEN C.T.'S IN THE POTR-ABLA COVER TYPE AND *ABIES LASIOCARPA* HABITAT TYPES IN THE INTERMOUNTAIN REGION

| Habitat types in ABLA series | Seral aspen community types | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | POTR-ABLA/SHCA | POTR-ABLA/AMAL | POTR-ABLA/SYOR/TALL FORB | POTR-ABLA/SYOR/THFE | POTR-ABLA/JUCO | POTR-ABLA/TALL FORB | POTR-ABLA/THFE | POTR-ABLA/CAGE | POTR-ABLA/CARO |
| **Idaho and western Wyoming[2]** | | | | | | | | | |
| ABLA/ARLA | 0.64 | NA | 0.44 | 0.53 | NA | 0.48 | 0.56 | 0.43 | NA |
| ABLA/SYAL | .76 | NA | .52 | .66 | NA | .35 | .57 | .55 | NA |
| ABLA/THOC | .87 | NA | .57 | .73 | NA | .62 | .65 | .66 | NA |
| ABLA/OSCH | .83 | NA | .68 | .74 | NA | .67 | .75 | .67 | NA |
| ABLA/CARU | .76 | NA | .47 | .60 | NA | .45 | .54 | .64 | NA |
| ABLA/CARO | .75 | NA | .48 | .69 | NA | .65 | .73 | .55 | NA |
| ABLA/BERE | .85 | NA | .57 | .73 | NA | .50 | .66 | .62 | NA |
| ABLA/ARCO | .77 | NA | .50 | .65 | NA | .54 | .65 | .55 | NA |
| **Northern Utah[3]** | | | | | | | | | |
| ABLA/OSCH | NA | 0.85 | .85 | .82 | 0.49 | .88 | .84 | .76 | NA |
| ABLA/CARU | NA | .61 | .43 | .67 | .35 | .36 | .57 | .62 | NA |
| ABLA/BERE | NA | .84 | .74 | .84 | .51 | .56 | .69 | .72 | NA |
| ABLA/ACGL | NA | .72 | .63 | .68 | .38 | .53 | .64 | .63 | NA |
| ABLA/VACA | NA | .29 | .31 | .39 | .50 | .30 | .46 | .40 | NA |
| ABLA/PERA | NA | .56 | .45 | .56 | .32 | .43 | .60 | .39 | NA |
| ABLA/RIMO | NA | .51 | .56 | .49 | .23 | .62 | .54 | .33 | NA |
| ABLA/JUCO | NA | NA | NA | NA | .61 | NA | NA | .33 | NA |
| **Southern Utah[4]** | | | | | | | | | |
| ABLA/CAGE | NA | NA | .63 | .75 | .51 | .62 | .69 | .81 | 0.38 |
| ABLA/CARO | NA | NA | .41 | .59 | .75 | .43 | .65 | .59 | .83 |
| ABLA/BERE | NA | NA | .63 | .81 | .68 | .46 | .68 | .73 | .57 |
| ABLA/ACGL | NA | NA | .60 | .71 | .42 | .41 | .61 | .63 | .29 |
| ABLA/VACA | NA | NA | .45 | .56 | .27 | .52 | .61 | .45 | .24 |
| ABLA/RIMO | NA | NA | .46 | .54 | .45 | .63 | .59 | .42 | .39 |
| ABLA/JUCO | NA | NA | .22 | .46 | .90 | .14 | .43 | .38 | .73 |

[1]Sorensen's index (SI= 2w/A+B) (Mueller-Dombois and Ellenberg 1974) based on constancy comparisons of only those species with 50 percent or greater constancy in the conifer habitat type. Values for species with 80 percent or greater constancy in the habitat type are double weighted.
[2]From Steele and others (1983).
[3]From Mauk and Henderson (1984).
[4]From Youngblood and Mauk (1985).

## APPENDIX E2: SIMILARITY INDICES[1] BETWEEN SERAL ASPEN C.T.'S IN THE POTR-PICO, POTR-PSME, AND POTR-ABCO COVER TYPES, AND CONIFEROUS FOREST TYPES PREVIOUSLY IDENTIFIED IN THE INTERMOUNTAIN REGION

| Coniferous forest types | Seral aspen community types | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | POTR-PICO/CAGE | POTR-PICO/SYOR | POTR-PICO JUCO | POTR-PICO/THFE | POTR-PSME/CARU | POTR-PSME/AMAL | POTR-PSME/SYOR | POTR-PSME/JUCO | POTR-ABCO/SYOR | POTR-ABCO/ARPA |
| **Idaho and western Wyoming**[2] | | | | | | | | | | |
| ABLA/CARU | 0.61 | 0.65 | 0.35 | 0.54 | NA | NA | NA | NA | NA | NA |
| ABLA/ARLA | .53 | .43 | .48 | .54 | NA | NA | NA | NA | NA | NA |
| ABLA/OSCH | .57 | .65 | .49 | .74 | NA | NA | NA | NA | NA | NA |
| ABLA/THOC | .64 | .79 | .49 | .74 | NA | NA | NA | NA | NA | NA |
| ABLA/BERE | .61 | .64 | .58 | .74 | NA | NA | NA | NA | NA | NA |
| ABLA/ARCO | .63 | .56 | .37 | .61 | NA | NA | NA | NA | NA | NA |
| PSME/BERE | .58 | .67 | .48 | .72 | 0.65 | 0.79 | 0.69 | 0.55 | NA | NA |
| PSME/OSCH | .64 | .74 | .51 | .68 | .73 | .87 | .78 | .57 | NA | NA |
| PSME/SYAL | .54 | .61 | .50 | .64 | .57 | .81 | .71 | .67 | NA | NA |
| PSME/CARU | .77 | .79 | .66 | .69 | .90 | .76 | .78 | .47 | NA | NA |
| PSME/ACGL | .53 | .64 | .42 | .62 | .59 | .78 | .64 | .49 | NA | NA |
| **Northern Utah**[3] | | | | | | | | | | |
| ABLA/CARU | .65 | .68 | .45 | .70 | NA | NA | NA | NA | NA | NA |
| ABLA/OSCH | .63 | .75 | .53 | .81 | NA | NA | NA | NA | NA | NA |
| ABLA/BERE | .57 | .63 | .49 | .85 | NA | NA | NA | NA | NA | NA |
| PICO/VACA | .50 | .41 | .52 | .64 | NA | NA | NA | NA | NA | NA |
| PICO/VASC | .49 | .46 | .46 | .60 | NA | NA | NA | NA | NA | NA |
| PICO/JUCO | .53 | .39 | .62 | .69 | NA | NA | NA | NA | NA | NA |
| PICO/ARUV | .58 | .38 | .67 | .58 | NA | NA | NA | NA | NA | NA |
| PICO/BERE | .69 | .55 | .72 | .72 | NA | NA | NA | NA | NA | NA |
| PICO/CARO | .56 | .51 | .48 | .56 | NA | NA | NA | NA | NA | NA |
| PSME/BERE | .62 | .70 | .56 | .78 | .69 | .81 | .73 | .66 | NA | NA |
| PSME/OSCH | .57 | .70 | .41 | .72 | .67 | .85 | .73 | .43 | NA | NA |
| PSME/SYOR | .46 | .50 | .67 | .46 | .24 | .35 | .44 | .78 | NA | NA |
| PSME/ACGL | .47 | .59 | .41 | .47 | .53 | .76 | .63 | .46 | NA | NA |
| ABCO/BERE | NA | NA | NA | NA | NA | NA | NA | NA | 0.78 | 0.54 |
| ABCO/OSCH | NA | NA | NA | NA | NA | NA | NA | NA | .57 | .34 |
| **Southern Utah**[4] | | | | | | | | | | |
| PSME/BERE | NA | NA | NA | NA | NA | .74 | .73 | .90 | NA | NA |
| PSME/SYOR | NA | NA | NA | NA | NA | .49 | .61 | .80 | NA | NA |
| ABCO/BERE | NA | NA | NA | NA | NA | NA | NA | NA | .77 | .62 |
| ABCO/SYOR | NA | NA | NA | NA | NA | NA | NA | NA | .67 | .75 |
| ABCO/ARPA | NA | NA | NA | NA | NA | NA | NA | NA | .54 | .82 |

[1]Sorensen's index (SI= 2w/A+B) (Mueller-Dombois and Ellenberg 1974) based on constancy comparisons of only those species with 50 percent or greater constancy in the conifer habitat type. Values for species with 80 percent or greater constancy in the habitat type are double weighted.
[2]From Steele and others (1983).
[3]From Mauk and Henderson (1984).
[4]From Youngblood and Mauk (1985).

# APPENDIX F: CONSTANCY AND AVERAGE CANOPY COVER (LATTER IN PARENTHESES) OF IMPORTANT PLANT SPECIES IN THE ASPEN COMMUNITY TYPES OF THE INTERMOUNTAIN REGION

| | POTR/ VECA | POTR/ PTAQ | POTR/ WYAM | POTR/ FETH | POTR/ TALL FORBS | POTR/ CARU | POTR/ THFE | POTR/ BRCA | POTR/ CARO | POTR/ STCO | POTR/ ASMI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 7 | 13 | 30 | 18 | 228 | 90 | 92 | 77 | 57 | 16 | 11 |
| TREES | | | | | | | | | | | |
| ABIES CONCOLOR | -( -) | -( -) | -( -) | 11( T) | 3( 3) | 1( T) | 3( 1) | 12( 1) | 2( 5) | -( -) | -( -) |
| ABIES LASIOCARPA | 14( T) | 8( 1) | 17( 1) | 39( 2) | 32( 2) | 29( 1) | 32( 3) | 26( 4) | 26( 4) | 19( 2) | 18( T) |
| PICEA ENGELMANNII | -( -) | -( -) | -( -) | 33( 3) | 7( 1) | 10( 1) | 11( T) | 5( 1) | 14( 3) | 25( T) | 36( 3) |
| PICEA PUNGENS | -( -) | -( -) | -( -) | -( -) | +( T) | -( -) | 4( 4) | 1( T) | -( -) | -( -) | -( -) |
| PINUS CONTORTA | 14( T) | -( -) | 13( T) | -( -) | 3( 3) | 26( 2) | 12( 3) | 8( 1) | 2( T) | 13( 3) | 9( 5) |
| PINUS FLEXILIS | -( -) | 8( 2) | -( -) | -( -) | 4( 1) | 13( 1) | 20( 1) | 18( 1) | 33( 1) | 6( T) | 27( 1) |
| PINUS PONDEROSA | -( -) | -( -) | -( -) | 6( T) | -( -) | -( -) | 1( 3) | -( -) | 4( 2) | 31( 3) | -( -) |
| POPULUS TREMULOIDES | 100(61) | 100(74) | 100(69) | 100(74) | 100(73) | 100(79) | 100(72) | 100(74) | 100(74) | 94(73) | 100(80) |
| POPULUS TREMULOIDES (reprod.) | 86( 4) | 77(12) | 77( 4) | 94( 3) | 81( 6) | 74( 5) | 63( 5) | 87( 5) | 88( 4) | 88(13) | 82(12) |
| PSEUDOTSUGA MENZIESII | -( -) | 8( 1) | 13( T) | -( -) | 5( 2) | 31( 2) | 11( 2) | 8( 1) | 9( 1) | 25( 1) | 9( T) |
| SHRUBS | | | | | | | | | | | |
| ACER GLABRUM | -( -) | 8( 2) | -( -) | -( -) | 1( 5) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ACER GRANDIDENTATUM | 14( T) | 23( 5) | 3( T) | -( -) | 5( 2) | 3( T) | 1( T) | 3( T) | -( -) | -( -) | -( -) |
| AMELANCHIER ALNIFOLIA | -( -) | 23( T) | 50( 4) | -( -) | 15( 1) | 31( 1) | 17( 1) | 12( 1) | -( -) | 6( T) | 18( 2) |
| ARCTOSTAPHYLOS UVA-URSI | -( -) | -( -) | 3( 1) | -( -) | -( -) | 4( 8) | 4(10) | -( -) | -( -) | -( -) | 9( 3) |
| ARTEMISIA TRIDENTATA | -( -) | -( -) | 10( 2) | -( -) | 6( T) | 8( 1) | 4( 1) | 9( 2) | 42( 3) | 31( 3) | 9( 2) |
| BERBERIS REPENS | 14( T) | -( -) | 7( 1) | -( -) | 10( 5) | 43( 5) | 39( 9) | 23( 1) | 18( 2) | 38( 2) | 27(10) |
| CEANOTHUS VELUTINUS | -( -) | -( -) | -( -) | -( -) | -( -) | 2(12) | 1( 3) | 1( T) | -( -) | -( -) | -( -) |
| CERCOCARPUS LEDIFOLIUS | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 1( 5) | -( -) | -( -) | 6( T) | -( -) |
| CHRYSOTHAMNUS VISCIDIFLORUS | -( -) | -( -) | -( -) | -( -) | +( 1) | -( -) | 1( T) | 3( T) | 16( T) | -( -) | -( -) |
| JUNIPERUS COMMUNIS | -( -) | 8( T) | -( -) | 11( 4) | +( 1) | 18( 2) | 9( 3) | 5( 2) | 23( 2) | 50( 3) | 64( 2) |
| LONICERA INVOLUCRATA | -( -) | -( -) | -( -) | -( -) | 1( 1) | 2( 1) | 2( T) | -( -) | -( -) | -( -) | 9( T) |
| PACHISTIMA MYRSINITES | -( -) | -( -) | -( -) | -( -) | 2( 2) | 11( 1) | 8( 1) | 5( T) | -( -) | -( -) | -( -) |
| PHYSOCARPUS MALVACEUS | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| PRUNUS VIRGINIANA | 14( T) | -( -) | 7( 3) | -( -) | 9( 2) | 13( 1) | 7( 2) | 4( 1) | -( -) | -( -) | -( -) |
| QUERCUS GAMBELII | -( -) | -( -) | -( -) | -( -) | +( 2) | -( -) | -( -) | -( -) | 2( T) | -( -) | -( -) |
| RIBES CEREUM | 14( T) | -( -) | 13( T) | -( -) | 7( 1) | 1( T) | 7( 2) | 3( T) | 7( T) | -( -) | -( -) |
| RIBES INERME | -( -) | -( -) | -( -) | -( -) | 2( 2) | 1( T) | 2( T) | 3( 2) | -( -) | -( -) | -( -) |
| RIBES LACUSTRE | -( -) | -( -) | -( -) | 6( 2) | 2( 2) | 1( T) | 1( T) | 3( 2) | 2( T) | -( -) | -( -) |
| RIBES MONTIGENUM | -( -) | -( -) | -( -) | -( -) | 5( 2) | 3( 1) | 4( 3) | 6( T) | 2( 1) | -( -) | -( -) |
| RIBES VISCOSISSIMUM | -( -) | -( -) | -( -) | -( -) | 1( T) | 1( T) | -( -) | 3( T) | -( -) | -( -) | -( -) |
| ROSA WOODSII + | 29( T) | 8( T) | 20( 1) | 44( 1) | 12( 1) | 42( 1) | 34( 1) | 19( 1) | 25( 1) | 31( 1) | 73( 6) |
| RUBUS PARVIFLORUS | -( -) | 8( 2) | -( -) | -( -) | 1( 2) | -( -) | -( -) | 3( T) | -( -) | -( -) | -( -) |
| SALIX SCOULERIANA | 29( 2) | 8( 5) | 3( T) | -( -) | 3( 1) | -( -) | 2( 3) | 1( 5) | -( -) | -( -) | -( -) |
| SAMBUCUS RACEMOSA + | 14( T) | 54( 1) | -( -) | -( -) | 29( 2) | -( -) | 5( 1) | 13( 1) | 2( T) | -( -) | -( -) |
| SHEPHERDIA CANADENSIS | -( -) | -( -) | 7( 2) | -( -) | 3( 2) | 8( 1) | 17( 1) | 4( 1) | -( -) | -( -) | -( -) |
| SORBUS SCOPULINA | -( -) | -( -) | -( -) | -( -) | 1( 2) | 2( 4) | 1( T) | 1( T) | -( -) | -( -) | -( -) |
| SPIRAEA BETULIFOLIA | -( -) | -( -) | -( -) | -( -) | -( -) | 1( 2) | -( -) | -( -) | -( -) | -( -) | -( -) |
| SYMPHORICARPOS ALBUS | -( -) | -( -) | -( -) | -( -) | 1( 2) | 8( 3) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| SYMPHORICARPOS OREOPHILUS | 43( 2) | 46( 1) | 77( 2) | 72( 2) | 62( 3) | 60( 2) | 65( 2) | 60( 2) | 61( 2) | 31( 1) | 45( 4) |
| VACCINIUM CAESPITOSUM | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | 1( T) | -( -) | -( -) | -( -) |
| GRAMINOIDS | | | | | | | | | | | |
| AGROPYRON TRACHYCAULUM + | 43( 8) | 23( 3) | 60( 4) | 61( 1) | 50( 4) | 60( 2) | 51( 5) | 86(12) | 56( 5) | 38( 1) | 36( 3) |
| BROMUS ANOMALUS | -( -) | -( -) | -( -) | 28( 3) | 1(10) | 3( T) | -( -) | 6( 2) | 51(10) | 6( T) | 9( 5) |
| BROMUS CARINATUS + | 57( 8) | 69( 6) | 73( 3) | 22(23) | 76(12) | 40( 2) | 53( 7) | 75(24) | 11( 5) | -( -) | 9( T) |
| BROMUS CILIATUS | -( -) | 8( 4) | 3( T) | 11( 3) | 6( 4) | 24( 4) | 23( 2) | 5( T) | 11(10) | 19( 3) | 45( 1) |
| CALAMAGROSTIS RUBESCENS | -( -) | -( -) | 17( 6) | -( -) | 4( 6) | 73(47) | 4( 1) | -( -) | -( -) | -( -) | -( -) |
| CAREX GEYERI | -( -) | -( -) | 3(20) | 6( T) | 4( 2) | 40(31) | 8( 2) | 12( 2) | -( -) | 6( T) | 18( 2) |
| CAREX HOODII | 43( 3) | 8( T) | 27( 2) | 11( T) | 25( 4) | 11( 1) | 23( 2) | 21( 7) | 2( 3) | -( -) | -( -) |
| CAREX ROSSII | -( -) | 15( 2) | 7( T) | 28( 2) | 5( 1) | -( -) | 15( 1) | 6( 1) | 96(13) | 19( 2) | 36( 2) |
| DACTYLIS GLOMERATA | 14( 3) | -( -) | 7( 2) | -( -) | 4( 4) | 7( T) | 5( T) | 8(14) | -( -) | -( -) | -( -) |
| ELYMUS CINEREUS | -( -) | -( -) | 10( 2) | -( -) | 4( 2) | 3( 1) | 2( T) | 1( 7) | 2( 2) | -( -) | -( -) |
| ELYMUS GLAUCUS | 29( 4) | 69( 8) | 37( 8) | -( -) | 42(13) | 42( 9) | 40( 7) | 27(24) | 2( T) | -( -) | -( -) |
| FESTUCA IDAHOENSIS + | -( -) | -( -) | 23( 1) | 22( T) | 2( 1) | 11( 1) | 22( 1) | 10( 3) | 14( 2) | 44(13) | 27( 2) |
| FESTUCA THURBERI | -( -) | -( -) | -( -) | 100(16) | -( -) | -( -) | -( -) | -( -) | 4( T) | 6( T) | -( -) |
| KOELERIA CRISTATA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 3(10) | 4( T) | 6( T) | 9(10) |
| LEUCOPOA KINGII | -( -) | -( -) | -( -) | 6( 1) | 1( 1) | 6( T) | 3( 7) | 4( 1) | 18( 3) | -( -) | 18( 1) |
| MELICA SPECTABILIS | 14( 2) | 8( T) | 33( 1) | -( -) | 33( 2) | 11( 1) | 28( 4) | 42( 5) | 2( 3) | 6( T) | 18( T) |
| PHLEUM ALPINUM | 14( 5) | -( -) | 3( T) | -( -) | 6( 2) | 10( 7) | 4( 8) | 8( 3) | -( -) | -( -) | -( -) |
| PHLEUM PRATENSE | 14(20) | -( -) | 20( 1) | -( -) | 4( 1) | 19( 3) | 8( 1) | 1(10) | -( -) | -( -) | 9( T) |
| POA AMPLA | -( -) | -( -) | 3( T) | -( -) | 4( 7) | 7( 2) | 18( 1) | 1( 2) | 5( 1) | -( -) | -( -) |
| POA FENDLERIANA | -( -) | -( -) | -( -) | 22( 1) | 1( T) | 1( T) | 7( 3) | 3( T) | 32( 2) | 56( 5) | 27( 1) |
| POA NERVOSA | 14( T) | 23( 1) | 10( 2) | -( -) | 32( 2) | 11(13) | 35( 6) | 35( 7) | 11( 4) | -( -) | 18( 1) |
| POA PALUSTRIS | -( -) | -( -) | 7( 3) | -( -) | 1( 1) | 13( 7) | 5(17) | 1( T) | -( -) | -( -) | -( -) |
| POA PRATENSIS | 29( 2) | 15( 4) | 60(14) | 39( 5) | 26(14) | 46(14) | 25(16) | 43(29) | 25( 6) | 19( 4) | 9( T) |
| SITANION HYSTRIX | -( -) | -( -) | -( -) | 33( 1) | -( -) | 2( T) | -( -) | -( -) | 28( 1) | 69(11) | 27( 1) |
| STIPA COMATA | -( -) | -( -) | -( -) | 22( 5) | -( -) | 1( T) | -( -) | -( -) | 2( T) | 69(17) | -( -) |
| STIPA OCCIDENTALIS + | -( -) | 8( T) | 3( 2) | 67( 2) | 12( 5) | 22( 7) | 25( 9) | 29( 7) | 61( 7) | 38( 4) | 27( 5) |
| TRISETUM SPICATUM | -( -) | -( -) | -( -) | 28( T) | 4( 1) | 11( 1) | 27( 1) | 17( T) | 11( 2) | 13( T) | 9( 1) |

(con.)

| | POTR/ VECA | POTR/ PTAQ | POTR/ WYAM | POTR/ FETH | POTR/ TALL FORBS | POTR/ CARU | POTR/ THFE | POTR/ BRCA | POTR/ CARO | POTR/ STCO | POTR/ ASMI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 7 | 13 | 30 | 18 | 228 | 90 | 92 | 77 | 57 | 16 | 11 |
| FORBS | | | | | | | | | | | |
| ACHILLEA MILLEFOLIUM | 29( T) | 15( 2) | 67( 1) | 72( 4) | 42( 2) | 74( 1) | 64( 1) | 66( 3) | 23( 1) | 31( 3) | 100( 1) |
| ACONITUM COLUMBIANUM | -( -) | -( -) | -( -) | -( -) | 2( 5) | 1( 5) | 1(20) | -( -) | -( -) | -( -) | -( -) |
| ACTAEA RUBRA | -( -) | 31( 9) | -( -) | -( -) | 6( 3) | -( -) | 2( 1) | 3( T) | -( -) | -( -) | -( -) |
| AGASTACHE URTICIFOLIA | 29( 8) | 62( 7) | 23( 3) | 11( 3) | 47( 5) | 3( 1) | 15( 1) | 22( 1) | -( -) | -( -) | -( -) |
| AGOSERIS AURANTIACA | -( -) | -( -) | 3( 1) | -( -) | 1( 2) | 3( T) | 3( T) | 4( T) | 4( T) | 6( T) | -( -) |
| AGOSERIS GLAUCA | -( -) | -( -) | 7( 1) | 6( T) | 6( T) | 8( T) | 8( T) | 10( T) | 14( T) | 13( T) | 9( T) |
| ALLIUM BREVISTYLUM | 14( T) | -( -) | 7( 3) | -( -) | 1( T) | 1( T) | 1( T) | 1( T) | -( -) | -( -) | -( -) |
| ANGELICA PINNATA | 14( 2) | -( -) | -( -) | -( -) | 3( T) | -( -) | 4( 5) | 1( T) | -( -) | -( -) | -( -) |
| ANTENNARIA MICROPHYLLA | -( -) | -( -) | 10( T) | 17( T) | 1( 6) | 18( 1) | 10( T) | 4( T) | 25( 1) | 44( 3) | 36( T) |
| APOCYNUM ANDROSAEMIFOLIUM | -( -) | -( -) | -( -) | -( -) | -( -) | 1( 3) | -( -) | 3( 1) | 2( T) | -( -) | 9( T) |
| AQUILEGIA COERULEA | -( -) | 8( T) | -( -) | 11( T) | 13( 1) | 12( T) | 11( 2) | 12( T) | 2( T) | -( -) | 9( 5) |
| AQUILEGIA FORMOSA | 29( T) | -( -) | 17( 3) | -( -) | 15( 3) | -( -) | 3( 4) | 4( 2) | -( -) | -( -) | -( -) |
| ARNICA CORDIFOLIA | -( -) | -( -) | 7( 2) | -( -) | 6( 5) | 21( 6) | 14(13) | 4( 1) | 2( T) | 6( 1) | 9( T) |
| ARNICA LATIFOLIA | -( -) | -( -) | -( -) | -( -) | +( T) | 1(10) | -( -) | -( -) | 2( 1) | -( -) | 9(10) |
| ARTEMISIA LUDOVICIANA | -( -) | -( -) | -( -) | -( -) | 2( 2) | 1( T) | 9( 3) | 1( T) | 2( T) | -( -) | -( -) |
| ASTER CHILENSIS | -( -) | -( -) | 3(10) | -( -) | 1( T) | -( -) | 1( T) | 5( T) | -( -) | -( -) | -( -) |
| ASTER ENGELMANNII | 14( T) | 62( 2) | 3( 1) | -( -) | 21( 5) | 14( 3) | 12( 1) | 13( 1) | -( -) | -( -) | -( -) |
| ASTER FOLIACEUS | 29( T) | -( -) | 13( 1) | -( -) | 4( 4) | 14( 1) | 21( 2) | 3(20) | -( -) | -( -) | 9( T) |
| ASTER PERELEGANS | -( -) | -( -) | 23( 1) | -( -) | 3( T) | 3( 1) | 11( 1) | 4( T) | -( -) | -( -) | 9( 1) |
| ASTRAGALUS MISER | -( -) | -( -) | 7( 2) | 6( 5) | 3( 5) | 30(12) | 17(15) | 1( T) | 18( 8) | 31( 4) | 100(30) |
| BALSAMORHIZA MACROPHYLLA | -( -) | -( -) | 10( 2) | -( -) | 2( 4) | 1( T) | 2( 5) | 1( T) | - J | -( -) | -( -) |
| BALSAMORHIZA SAGITTATA | -( -) | -( -) | 7( 3) | -( -) | 3( 3) | 1( 1) | 3( 2) | 1( T) | -( -) | -( -) | -( -) |
| CALOCHORTUS NUTTALLII | -( -) | 8( T) | 3( T) | 6( T) | +( T) | 3( T) | -( -) | 3( T) | 5( T) | 13( T) | -( -) |
| CAMPANULA ROTUNDIFOLIA | -( -) | -( -) | -( -) | -( -) | 1( 1) | 17( T) | 10( T) | -( -) | -( -) | -( -) | 18( T) |
| CASTILLEJA LINARIAEFOLIA | -( -) | -( -) | -( -) | -( -) | -( -) | 9( 2) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| CASTILLEJA MINIATA | -( -) | 8( T) | 13( T) | 11( T) | 7( 1) | 10( 1) | 9( 1) | 9( 1) | 5( T) | 6( 2) | 27( T) |
| CIRSIUM ARVENSE | -( -) | 8( T) | 3( T) | 11( T) | 1( T) | 3( T) | 2( T) | 3( T) | -( -) | 6( T) | -( -) |
| CIRSIUM VULGARE | 14( T) | -( -) | -( -) | -( -) | +( T) | 1( T) | 1( T) | 1( 1) | -( -) | -( -) | -( -) |
| CLAYTONIA LANCEOLATA | 14( T) | -( -) | 3( 2) | -( -) | 3( 2) | 1( T) | 3( 1) | 1( 5) | -( -) | -( -) | -( -) |
| CORALLORHIZA MACULATA | -( -) | -( -) | 13( T) | 17( T) | 3( T) | 6( T) | 5( T) | 1( T) | 5( T) | 6( T) | 9( T) |
| CREPIS ACUMINATA | -( -) | -( -) | 3( T) | -( -) | 1( 1) | -( -) | -( -) | 5( T) | 2( T) | -( -) | 9( T) |
| DELPHINIUM NUTTALLIANUM | -( -) | 15( T) | 17( T) | -( -) | 18( T) | 2( T) | 4( T) | 8( T) | -( -) | 6( T) | -( -) |
| DELPHINIUM OCCIDENTALE + | 29( T) | 38( 1) | 13( 1) | 11( 3) | 32( 5) | 10( 1) | 11( 1) | 14( 1) | -( -) | -( -) | -( -) |
| DISPORUM TRACHYCARPUM | -( -) | -( -) | -( -) | -( -) | -( -) | 2( T) | -( -) | -( -) | -( -) | -( -) | -( -) |
| EPILOBIUM ANGUSTIFOLIUM | -( -) | -( -) | 13( T) | 11( 1) | 9( 1) | 20( 3) | 26( 2) | 3( 1) | 2( T) | -( -) | 18( 1) |
| EQUISETUM ARVENSE | -( -) | -( -) | -( -) | -( -) | +( 4) | -( -) | 2( 5) | -( -) | -( -) | -( -) | -( -) |
| ERIGERON FLAGELLARIS | -( -) | 8( 1) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) | 7( T) | -( -) | 9( T) |
| ERIGERON PEREGRINUS | -( -) | -( -) | -( -) | -( -) | 1( 1) | 3( 1) | 1( T) | 1( 1) | -( -) | 6( T) | -( -) |
| ERIGERON SPECIOSUS | 43( T) | 8( 1) | 17( T) | 6( T) | 8( 3) | 8( 1) | 5( 2) | 12( T) | 4( T) | 6( 1) | 9( T) |
| FRAGARIA VESCA + | -( -) | 8( T) | 13( 2) | 22( 2) | 11( 4) | 50( 2) | 40( 5) | 12( 2) | 12( 3) | 6(15) | 18( T) |
| FRASERA SPECIOSA | -( -) | -( -) | 23( 1) | -( -) | 5( 1) | 21( 1) | 26( 2) | 4( 2) | 4( 1) | -( -) | -( -) |
| FRITILLARIA ATROPURPUREA | -( -) | 8( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 4( T) | 6( T) | -( -) |
| GALIUM BOREALE | 14( T) | 23( 3) | 20( T) | -( -) | 10( 2) | 37( 1) | 25( 2) | 6( 2) | -( -) | 6( T) | 27( 1) |
| GERANIUM RICHARDSONII | -( -) | 15( 3) | -( -) | 6(18) | 8( 5) | 2( 2) | 3( T) | 1(10) | -( -) | -( -) | -( -) |
| GERANIUM VISCOSISSIMUM + | 14( T) | -( -) | 87( 7) | 6( T) | 35( 7) | 80( 8) | 61(11) | 21( 2) | 7( 2) | 19( 2) | 27( 1) |
| HABENARIA UNALASCENSIS | -( -) | -( -) | 10( T) | -( -) | 2( T) | 9( 1) | -( -) | 1( T) | -( -) | -( -) | -( -) |
| HACKELIA FLORIBUNDA | 43( 2) | 46( 1) | 43( 4) | -( -) | 51( 4) | 11( 3) | 18( 2) | 27( 1) | -( -) | -( -) | -( -) |
| HACKELIA PATENS | -( -) | -( -) | -( -) | -( -) | 1( 1) | -( -) | -( -) | 1( T) | -( -) | -( -) | -( -) |
| HEDYSARUM BOREALE | -( -) | -( -) | 7( 6) | -( -) | 2( 2) | 7( 6) | 15( 5) | -( -) | 2( 1) | -( -) | 9( T) |
| HELENIUM HOOPESII | 14( T) | -( -) | -( -) | 28( T) | 5( 2) | 1(10) | 8( 2) | 9( 4) | 5( T) | 6( T) | 9( 2) |
| HELIANTHELLA UNIFLORA | -( -) | -( -) | 23( 4) | -( -) | 6(10) | 3( 1) | 5( 2) | 1( T) | -( -) | -( -) | -( -) |
| HERACLEUM LANATUM | -( -) | 23( 3) | -( -) | -( -) | 12(15) | -( -) | 2( T) | -( -) | -( -) | -( -) | -( -) |
| HIERACIUM ALBIFLORUM | -( -) | -( -) | -( -) | -( -) | +( T) | 3( T) | 1( T) | 1( T) | -( -) | -( -) | -( -) |
| HIERACIUM CYNOGLOSSOIDES | -( -) | -( -) | -( -) | -( -) | 1( T) | 9( T) | 3( T) | 3( T) | -( -) | 6( T) | -( -) |
| HYDROPHYLLUM CAPITATUM | 43( 2) | 15( 1) | 7( 1) | -( -) | 28( 2) | -( -) | 14( 2) | 23( 1) | -( -) | -( -) | -( -) |
| LATHYRUS LANSZWERTII | 14( 5) | 38(17) | -( -) | 39(31) | 29(14) | 9(23) | 8(16) | 26(26) | 4(17) | 6( 4) | -( -) |
| LATHYRUS LEUCANTHUS | -( -) | 8(10) | -( -) | 28(36) | 9(16) | 6(32) | 2(24) | 10(11) | 4(33) | -( -) | -( -) |
| LATHYRUS PAUCIFLORUS | 14( 5) | -( -) | -( -) | -( -) | 4( 1) | -( -) | 8( 1) | 5( T) | -( -) | -( -) | -( -) |
| LIGUSTICUM FILICINUM | 14( T) | -( -) | 10(10) | -( -) | 12(17) | 6( 8) | 12(12) | 3( T) | -( -) | -( -) | 9( 5) |
| LUPINUS ARGENTEUS | -( -) | -( -) | 17( 5) | 6( T) | 11(10) | 61( 7) | 33( 4) | 8( 4) | 14(13) | 50(19) | 55(19) |
| LUPINUS CAUDATUS | -( -) | -( -) | 10( 1) | -( -) | 1( 5) | 1( 1) | 3( 1) | 1(10) | -( -) | -( -) | -( -) |
| LUPINUS LAXIFLORUS | -( -) | -( -) | 13( 1) | -( -) | 7( 4) | -( -) | 9( 8) | 17( 7) | -( -) | -( -) | -( -) |
| LUPINUS SERICEUS | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 4( 2) | 51( 6) | -( -) | -( -) |
| MERTENSIA ARIZONICA + | 71(11) | 15( 1) | -( -) | 11( 3) | 33(14) | 2( 5) | 8( 2) | 10( 2) | 2( 5) | -( -) | -( -) |
| MERTENSIA LONGIFLORA | -( -) | -( -) | -( -) | -( -) | 1(24) | -( -) | 1( 3) | -( -) | -( -) | -( -) | -( -) |
| OSMORHIZA CHILENSIS + | 29( 3) | 54( 5) | 27( 9) | 17( 2) | 44( 5) | 54( 3) | 50( 5) | 30( 2) | 2( 4) | 6( T) | 18( T) |
| OSMORHIZA OCCIDENTALIS | 14( T) | -( -) | 27( 8) | -( -) | 53(11) | 7( 1) | 14( 2) | 19( 1) | -( -) | -( -) | -( -) |
| PAEONIA BROWNII | -( -) | -( -) | 7( T) | -( -) | 1( 2) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| PENSTEMON PROCERUS | -( -) | -( -) | -( -) | 6( T) | +( T) | -( -) | 5( 4) | 3( T) | -( -) | -( -) | 9( 1) |
| PENSTEMON WATSONI | -( -) | -( -) | 7( 2) | 6( 2) | 2( 2) | -( -) | 8( 1) | 25( 1) | 11( 1) | -( -) | -( -) |

(con.)

# APPENDIX F (Con.)

| | POTR/ VECA | POTR/ PTAQ | POTR/ WYAM | POTR/ FETH | POTR/ TALL FORBS | POTR/ CARU | POTR/ THFE | POTR/ BRCA | POTR/ CARO | POTR/ STCO | POTR/ ASMI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 7 | 13 | 30 | 18 | 228 | 90 | 92 | 77 | 57 | 16 | 11 |
| PERIDERIDIA GAIRDNERI | 14( T) | -( -) | 27( 1) | -( -) | 9( 1) | 37( 1) | 14( 1) | 6( 3) | -( -) | 6( T) | -( -) |
| PHACELIA HETEROPHYLLA | -( -) | 31( 1) | -( -) | -( -) | 11( 1) | 1( T) | 2( T) | 8( 7) | -( -) | 6( T) | -( -) |
| POLEMONIUM FOLIOSISSIMUM + | -( -) | 31( 1) | -( -) | -( -) | 25( 3) | 1( 1) | 10( 2) | 9( T) | -( -) | -( -) | -( -) |
| POTENTILLA DIVERSIFOLIA | -( -) | -( -) | -( -) | 17( T) | -( -) | -( -) | -( -) | -( -) | 5( T) | 6( 2) | -( -) |
| POTENTILLA GLANDULOSA | -( -) | 8( T) | 23( 1) | 22( T) | 16( 1) | 44( 1) | 24( 1) | 10( 1) | -( -) | 19( 2) | 18( T) |
| POTENTILLA GRACILIS | -( -) | -( -) | 27( 2) | 44( T) | 12( 1) | 29( 2) | 32( 1) | 17( 1) | 5( T) | 19( T) | 27( T) |
| PTERIDIUM AQUILINUM | -( -) | 100(56) | -( -) | -( -) | +( T) | 1( 5) | -( -) | -( -) | -( -) | -( -) | -( -) |
| RANUNCULUS INAMOENUS | -( -) | -( -) | -( -) | 6( T) | 3( 3) | 4( T) | 5( T) | 10( 1) | 4( T) | -( -) | -( -) |
| RUDBECKIA OCCIDENTALIS | 43( 3) | 92( 9) | 13(10) | -( -) | 56(19) | 6( 4) | 12( 1) | 25( 1) | -( -) | -( -) | -( -) |
| SCROPHULARIA LANCEOLATA | 14( T) | 31( 1) | -( -) | -( -) | 14( 2) | 1( T) | -( -) | 8( T) | -( -) | -( -) | -( -) |
| SENECIO CRASSULUS | -( -) | -( -) | 3( 1) | 6( T) | 6( 2) | 4( 2) | 5( 2) | 3( T) | -( -) | 6( 4) | -( -) |
| SENECIO CYMBALARIOIDES | -( -) | 8( T) | -( -) | -( -) | 7( 1) | 6( T) | 7( 1) | 12( 1) | 2( T) | -( -) | 9( T) |
| SENECIO INTEGERRIMUS | -( -) | -( -) | 13( 1) | -( -) | 3( 1) | 3( T) | 5( 1) | 3( T) | 14( T) | 6( T) | -( -) |
| SENECIO SERRA + | 29(30) | 46( 4) | 50( 6) | -( -) | 49( 5) | 11( 1) | 18( 1) | 19( 1) | -( -) | -( -) | -( -) |
| SENECIO STREPTANTHIFOLIUS | -( -) | -( -) | -( -) | -( -) | +( T) | 4( T) | 4( T) | -( -) | -( -) | -( -) | 9( T) |
| SIDALCEA OREGANA | 14( 3) | -( -) | 13( T) | -( -) | 2( 3) | -( -) | -( -) | 3( 1) | -( -) | -( -) | -( -) |
| SILENE MENZIESII | -( -) | 8( T) | -( -) | 6( T) | 5( 1) | 6( 1) | 7( 2) | 8( 1) | 2( T) | 6( T) | 9( T) |
| SMILACINA RACEMOSA | -( -) | 8( T) | 17( 1) | -( -) | 8( 2) | 10( 1) | 3( 3) | 3( 3) | -( -) | -( -) | -( -) |
| SMILACINA STELLATA | 29( 2) | 38(14) | -( -) | 11( T) | 12( 3) | 28( 1) | 25( 2) | 6( 4) | 2( T) | -( -) | 9( T) |
| STELLARIA JAMESIANA | 71( 3) | 38( 2) | 40( 1) | 22( 3) | 61( 3) | 16( 4) | 28( 3) | 66( 4) | 51( 1) | 6( T) | -( -) |
| TARAXACUM OFFICINALE | 29( 5) | 8( T) | 67( 4) | 78( 8) | 36( 2) | 57( 3) | 51( 2) | 51( 6) | 51( 4) | 88( 3) | 64( 2) |
| THALICTRUM FENDLERI + | 29( 4) | 46( 4) | 37( 6) | 6( 4) | 61(12) | 52( 8) | 76(18) | 45( 3) | 14( 1) | 13( T) | 27( 1) |
| THERMOPSIS MONTANA | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | 3( 2) | 1( T) | -( -) | -( -) | 9( 5) |
| TRAGOPOGON DUBIUS | 14( T) | 8( T) | 7( T) | -( -) | 4( T) | 4( T) | 5( T) | 8( T) | 4( T) | 6( T) | -( -) |
| TRIFOLIUM GYMNOCARPON | -( -) | -( -) | 3( T) | -( -) | -( -) | -( -) | 1( T) | 6( 4) | 2(20) | -( -) | -( -) |
| TRIFOLIUM LONGIPES | 14(10) | -( -) | -( -) | 6( T) | 4(13) | 4( 3) | -( -) | 9( 4) | 9(16) | 19(10) | 9( 3) |
| URTICA DIOICA | 14(10) | 31( 1) | -( -) | -( -) | 4( 1) | 1( 1) | 2( T) | 5( 1) | -( -) | -( -) | -( -) |
| VALERIANA OCCIDENTALIS | 57( 4) | 31( 3) | 20( 2) | -( -) | 59( 7) | 14( 3) | 17( 3) | 19( 1) | -( -) | -( -) | -( -) |
| VERATRUM CALIFORNICUM | 100(45) | -( -) | 3( T) | -( -) | 2( 1) | 1( T) | -( -) | 1( T) | -( -) | -( -) | -( -) |
| VERBASCUM THAPSUS | -( -) | -( -) | -( -) | -( -) | 1( T) | 1( T) | 2( T) | 3( T) | -( -) | -( -) | -( -) |
| VICIA AMERICANA | 29( 4) | 15( 1) | -( -) | 67( 7) | 24( 7) | 6( 1) | 10( 1) | 23( 7) | 4(11) | 6( 1) | -( -) |
| VIGUIERA MULTIFLORA | -( -) | 8( T) | 3( 1) | 6( T) | 4( 1) | 1( 1) | 1( T) | 8( T) | -( -) | -( -) | -( -) |
| VIOLA ADUNCA | -( -) | -( -) | 7( T) | -( -) | 7( 1) | 12( 1) | 17( 1) | 12( 1) | 4( 1) | -( -) | 9( T) |
| VIOLA NUTTALLII | -( -) | 15( T) | 23( 6) | -( -) | 26( 3) | 7( 1) | 20( 2) | 14( 1) | 2( T) | -( -) | -( -) |
| VIOLA PURPUREA | -( -) | -( -) | -( -) | -( -) | 1( 1) | -( -) | 9( 1) | 3( 1) | -( -) | -( -) | -( -) |
| WYETHIA AMPLEXICAULIS | 14( 5) | -( -) | 100(40) | -( -) | 5( 1) | 1( T) | 4( T) | 3( 2) | -( -) | -( -) | -( -) |
| ANNUALS | | | | | | | | | | | |
| ANDROSACE SEPTENTRIONALIS | -( -) | -( -) | -( -) | -( -) | 2( T) | 2( 2) | 3( 1) | 9( T) | 2( T) | 6( T) | 9( T) |
| CHENOPODIUM FREMONTII | -( -) | 8( 3) | -( -) | 6( T) | 8( 2) | -( -) | 2( T) | 13( 2) | 2( T) | 6( T) | -( -) |
| COLLINSIA PARVIFLORA | -( -) | 15( 4) | 3( T) | -( -) | 12( 7) | 4( 1) | 13( 4) | 21( 4) | 2( T) | -( -) | -( -) |
| COLLOMIA LINEARIS | -( -) | 15( T) | 10( 4) | 11( T) | 27( 4) | 8( 1) | 14( 3) | 23( 2) | 4( T) | -( -) | -( -) |
| DESCURAINIA RICHARDSONII | 14( T) | 62( 1) | 13( T) | 28( 1) | 44( 1) | 3( 3) | 14( 1) | 39( 1) | 12( T) | 6( T) | -( -) |
| GALIUM APARINE | 14( T) | -( -) | -( -) | -( -) | 1( 5) | -( -) | 4( 2) | -( -) | -( -) | -( -) | -( -) |
| GALIUM BIFOLIUM | 14(15) | 31(10) | 33( 6) | -( -) | 32( 5) | 7( 9) | 17( 5) | 22( 8) | 2( 1) | ( T) | -( -) |
| MADIA GLOMERATA | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) | 3( 5) | -( -) | -( -) | -( -) |
| NEMOPHILA BREVIFLORA | 71(15) | 54( 5) | 37(14) | -( -) | 48(24) | 2( 3) | 12(29) | 27(20) | -( -) | -( -) | -( -) |
| POLYGONUM DOUGLASII | -( -) | 23( T) | 3( T) | 6( T) | 20( 6) | 3( 5) | 13( 3) | 38( 4) | 7( T) | 19( T) | -( -) |

(con.)

# APPENDIX F (Con.)

| | POTR/ POPR | POTR/ RUPA | POTR/ SARA | POTR/ SHCA | POTR/ SYOR/ TALL FORB | POTR/ SYOR/ CARU | POTR/ SYOR/ THFE | POTR/ SYOR/ FETH | POTR/ SYOR/ CARO | POTR/ SYOR/ WYAM | POTR/ SYOR/ BRCA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 20 | 4 | 11 | 11 | 205 | 88 | 79 | 7 | 18 | 6 | 66 |
| TREES | | | | | | | | | | | |
| ABIES CONCOLOR | 5( 5) | -( -) | -( -) | -( -) | 11( 2) | 1( T) | 8( 4) | 14( T) | 17( 4) | -( -) | 9( 1) |
| ABIES LASIOCARPA | 35( 2) | 25( 6) | 27( 4) | 64( T) | 27( 2) | 31( 1) | 28( 2) | 14( 5) | 17( 3) | -( -) | 20( 1) |
| PICEA ENGELMANNII | 20( 3) | 25( T) | 9( T) | 55( 2) | 1( 2) | 3( 2) | 3( 2) | 14( T) | 17( 1) | -( -) | 5( 2) |
| PICEA PUNGENS | 5( 5) | -( -) | -( -) | -( -) | +( T) | 2( 1) | 3( T) | -( -) | -( -) | -( -) | 2( T) |
| PINUS CONTORTA | 5( 4) | 50( 3) | -( -) | 18( 1) | 2( 1) | 23( 2) | 11( 2) | -( -) | -( -) | -( -) | 5( 5) |
| PINUS FLEXILIS | 20( 1) | 25( T) | -( -) | 55( 1) | 1( 4) | 10( 1) | 10( 1) | 14( 1) | -( -) | -( -) | 6( T) |
| PINUS PONDEROSA | 10( 1) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | 14( T) | 6( T) | -( -) | 2( 1) |
| POPULUS TREMULOIDES | 100(71) | 100(60) | 100(62) | 100(70) | 100(68) | 100(74) | 100(73) | 100(72) | 100(75) | 100(63) | 100(70) |
| POPULUS TREMULOIDES (reprod.) | 90( 5) | 75( 2) | 73( 2) | 45( 8) | 87( 5) | 80( 7) | 87( 5) | 100(11) | 89( 7) | 83( 1) | 71( 8) |
| PSEUDOTSUGA MENZIESII | 15( 2) | 25( 1) | -( -) | 18( 2) | 9( 2) | 33( 1) | 28( 2) | 43( 3) | 33( 3) | -( -) | 18( 3) |
| SHRUBS | | | | | | | | | | | |
| ACER GLABRUM | -( -) | -( -) | -( -) | -( -) | 1( 1) | -( -) | 4( 2) | -( -) | -( -) | -( -) | -( -) |
| ACER GRANDIDENTATUM | -( -) | -( -) | -( -) | -( -) | 4( 1) | 3( T) | 5( 1) | -( -) | -( -) | -( -) | 8( 1) |
| AMELANCHIER ALNIFOLIA | 25( 1) | 25( T) | -( -) | 36( 3) | 31( 2) | 59( 2) | 42( 2) | 29( T) | 6( T) | 83( 2) | 30( 1) |
| ARCTOSTAPHYLOS UVA-URSI | -( -) | -( -) | -( -) | 18(10) | -( -) | 1( 1) | 1( 5) | -( -) | -( -) | -( -) | 2( 3) |
| ARTEMISIA TRIDENTATA | 15( 1) | -( -) | -( -) | -( -) | 5( 1) | 9( 1) | 11( 1) | -( -) | 22( 1) | -( -) | 26( 2) |
| BERBERIS REPENS | 30( 3) | 50( 1) | -( -) | 55( 5) | 17( 2) | 56( 4) | 42( 6) | 57( 7) | 17( 7) | 17( T) | 38( 7) |
| CEANOTHUS VELUTINUS | 5( T) | 25( 8) | -( -) | -( -) | 1( 2) | 7( 5) | 8( 5) | -( -) | -( -) | -( -) | 3(10) |
| CHRYSOTHAMNUS VISCIDIFLORUS | -( -) | -( -) | -( -) | -( -) | +( T) | 1(20) | 5( 2) | -( -) | 11( T) | 17( 1) | 17( 1) |
| JUNIPERUS COMMUNIS | 50( 2) | 25( 4) | -( -) | -( -) | +( T) | 9( 4) | 11( 3) | 14( T) | 22( 4) | -( -) | 12( 4) |
| LONICERA INVOLUCRATA | -( -) | -( -) | -( -) | 9( 1) | +( T) | 2( 1) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| PACHISTIMA MYRSINITES | -( -) | 75(16) | -( -) | 36(48) | 4( 7) | 26(18) | 24(18) | -( -) | 6( 3) | -( -) | 11( 6) |
| PHYSOCARPUS MALVACEUS | -( -) | -( -) | -( -) | -( -) | +( T) | 1( 5) | -( -) | -( -) | -( -) | -( -) | -( -) |
| PRUNUS VIRGINIANA | 5( 1) | -( -) | 9( 5) | 27( 1) | 28( 2) | 28( 2) | 20( 2) | -( -) | -( -) | 33( 3) | 11( 1) |
| QUERCUS GAMBELII | 10( 1) | -( -) | -( -) | -( -) | 1( T) | -( -) | 1( 5) | 14( T) | -( -) | -( -) | 2( 5) |
| RIBES CEREUM | 5( T) | 25( T) | -( -) | 9( 1) | 9( 5) | 1( T) | 15( 2) | -( -) | 6( T) | 67( 8) | 6( 1) |
| RIBES INERME | 10( 1) | -( -) | -( -) | -( -) | 4( 1) | ( -) | -( -) | -( -) | -( -) | -( -) | 6( 1) |
| RIBES LACUSTRE | -( -) | -( -) | -( -) | -( -) | 2( T) | -( -) | 1( T) | -( -) | -( -) | -( -) | 2( 5) |
| RIBES MONTIGENUM | -( -) | -( -) | 9(17) | -( -) | 1( 6) | -( -) | 3( T) | -( -) | -( -) | -( -) | -( -) |
| RIBES VISCOSISSIMUM | -( -) | -( -) | -( -) | 9( T) | 1( T) | 3( T) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ROSA WOODSII + | 35( 2) | 50( T) | -( -) | 82(15) | 29( 2) | 64( 5) | 43( 5) | 86( 4) | 50( 1) | -( -) | 41( 1) |
| RUBUS PARVIFLORUS | -( -) | 100(44) | -( -) | -( -) | +( T) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| SALIX SCOULERIANA | -( -) | 25( T) | -( -) | 9( T) | 1( 2) | 8( 2) | 3( 4) | -( -) | -( -) | -( -) | 2( 1) |
| SAMBUCUS RACEMOSA + | -( -) | -( -) | 100(25) | -( -) | 11( 1) | 2( T) | 1( T) | 14( T) | -( -) | -( -) | 3( 1) |
| SHEPHERDIA CANADENSIS | -( -) | 75( 2) | -( -) | 100(30) | 1( T) | 7( 2) | 11( 2) | -( -) | 6( 1) | -( -) | -( -) |
| SORBUS SCOPULINA | -( -) | 25( T) | -( -) | -( -) | 1( T) | 2( 1) | 6( 2) | -( -) | -( -) | -( -) | -( -) |
| SPIRAEA BETULIFOLIA | -( -) | -( -) | -( -) | -( -) | -( -) | 9(13) | 1(65) | -( -) | -( -) | -( -) | -( -) |
| SYMPHORICARPOS ALBUS | -( -) | -( -) | -( -) | -( -) | 1(57) | 28(24) | 5(18) | -( -) | -( -) | -( -) | -( -) |
| SYMPHORICARPOS OREOPHILUS | 80( 3) | 50( T) | 64(10) | 73( 8) | 99(31) | 74(22) | 95(22) | 100(31) | 100(28) | 100(25) | 100(32) |
| GRAMINOIDS | | | | | | | | | | | |
| AGROPYRON SPICATUM | -( -) | -( -) | -( -) | -( -) | -( -) | 1( 1) | -( -) | -( -) | -( -) | -( -) | 2( T) |
| AGROPYRON TRACHYCAULUM + | 55( 3) | 50( 2) | 73( 1) | 64( 1) | 59( 5) | 44( 2) | 66( 4) | 71( 3) | 56( 2) | 67( 5) | 83( 8) |
| BROMUS ANOMALUS | 10( 3) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | 71( 7) | 72(10) | -( -) | 3( 4) |
| BROMUS CARINATUS + | 35( 3) | 25( 1) | 82(22) | 9( T) | 76( 8) | 19( 1) | 58( 9) | -( -) | 28( 1) | 100( 3) | 70(12) |
| BROMUS CILIATUS | -( -) | 25( T) | -( -) | 45(19) | 2( 1) | 17( 2) | 6( 2) | 14( 3) | 17( 4) | -( -) | 9( 3) |
| CALAMAGROSTIS RUBESCENS | 5( 2) | 25(20) | -( -) | 18(39) | 3(20) | 66(44) | 9( 3) | -( -) | -( -) | -( -) | 2( 2) |
| CAREX GEYERI | 15( 3) | 25( 7) | -( -) | 9( 1) | 5(12) | 47(28) | 9( 1) | -( -) | -( -) | -( -) | 8( 3) |
| CAREX HOODII | 10( 2) | -( -) | 9( 3) | 18( 3) | 26( 3) | 8( 1) | 20( 5) | -( -) | 6( 7) | 33( T) | 12( 1) |
| CAREX ROSSII | 10( T) | 25( T) | -( -) | 9( T) | 2( T) | 3( T) | 9( 1) | 14(10) | 72( 7) | -( -) | 14( 2) |
| DACTYLIS GLOMERATA | 25( T) | -( -) | -( -) | -( -) | 9( 3) | 3( 4) | 5( T) | -( -) | -( -) | -( -) | 5(11) |
| ELYMUS CINEREUS | 5( 1) | -( -) | -( -) | -( -) | 5( 6) | 5( 2) | 3(40) | -( -) | -( -) | -( -) | 6( 1) |
| ELYMUS GLAUCUS | 10( 2) | 50( 2) | 55( 9) | 36( 6) | 45( 9) | 52( 7) | 33( 8) | -( -) | -( -) | 50( T) | 26(21) |
| FESTUCA IDAHOENSIS + | 25( 3) | -( -) | -( -) | 9( T) | 1( T) | 6( 1) | 9( 4) | -( -) | 28( T) | -( -) | 8( 4) |
| FESTUCA THURBERI | -( -) | -( -) | -( -) | -( -) | -( -) | 2( 2) | -( -) | 100(13) | 6( 1) | -( -) | -( -) |
| HORDEUM JUBATUM | -( -) | 25( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| KOELERIA CRISTATA | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) | 6( T) | -( -) | -( -) |
| LEUCOPOA KINGII | -( -) | -( -) | -( -) | -( -) | -( -) | 2( T) | -( -) | -( -) | -( -) | -( -) | 2( 1) |
| MELICA SPECTABILIS | 15( 2) | -( -) | 18( 1) | 9(13) | 19( 1) | 9( 1) | 22( 5) | -( -) | 6( T) | 50( 1) | 18( 6) |
| PHLEUM ALPINUM | -( -) | -( -) | -( -) | -( -) | 4( 1) | 10( 2) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| PHLEUM PRATENSE | -( -) | -( -) | -( -) | 9( 6) | 3( 7) | 2( T) | 5( 2) | -( -) | -( -) | -( -) | -( -) |
| POA AMPLA | -( -) | -( -) | -( -) | 18( 1) | -( -) | 1( 2) | 4( 2) | -( -) | 17( 1) | -( -) | -( -) |
| POA FENDLERIANA | 5( 3) | -( -) | -( -) | 18( T) | -( -) | 1( T) | 5( 1) | 14( 3) | 22( 2) | -( -) | 6( 4) |
| POA NERVOSA | 10( 6) | 50( T) | 27( 3) | 27(10) | 17( 2) | 3( T) | 13(10) | -( -) | 6( 1) | -( -) | 9( 4) |
| POA PALUSTRIS | -( -) | -( -) | -( -) | 9( 5) | 1(38) | 3( 1) | -( -) | -( -) | -( -) | -( -) | -( -) |
| POA PRATENSIS | 100(35) | -( -) | 9( T) | 27(14) | 33(12) | 42( 9) | 39(21) | 14(10) | 39( 8) | 33( 3) | 48(20) |
| SITANION HYSTRIX | 10( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 28( 1) | -( -) | 3( T) |
| STIPA COMATA | 10( 2) | -( -) | -( -) | -( -) | -( -) | 1( 2) | 1( T) | -( -) | -( -) | -( -) | 2( 3) |
| STIPA OCCIDENTALIS + | 35( 2) | -( -) | 9( T) | -( -) | 14( 1) | 20( 4) | 33( 6) | 71( 3) | 83( 6) | 33( 1) | 41( 6) |
| TRISETUM SPICATUM | 10( T) | 50( 1) | 9( T) | 27( 1) | 1( T) | 3( T) | 5( T) | -( -) | -( -) | -( -) | -( -) |

(con.)

# APPENDIX F (Con.)

| | POTR/ POPR | POTR/ RUPA | POTR/ SARA | POTR/ SHCA | POTR/ SYOR/ TALL FORB | POTR/ SYOR/ CARU | POTR/ SYOR/ THFE | POTR/ SYOR/ FETH | POTR/ SYOR/ CARO | POTR/ SYOR/ WYAM | POTR/ SYOR/ BRCA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 20 | 4 | 11 | 11 | 205 | 88 | 79 | 7 | 18 | 6 | 66 |
| FORBS | | | | | | | | | | | |
| ACHILLEA MILLEFOLIUM | 65( 3) | 25( 2) | 64( T) | 55( 2) | 49( 1) | 67( 1) | 51( 1) | 86( T) | 44( 2) | 33( 2) | 61( 1) |
| ACONITUM COLUMBIANUM | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ACTAEA RUBRA | -( -) | -( -) | 27( 1) | -( -) | 3( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 2(10) |
| AGASTACHE URTICIFOLIA | -( -) | -( -) | 45( 9) | -( -) | 74( 5) | 8( T) | 15( 1) | -( -) | 6( T) | 67( 2) | 29( 1) |
| AGOSERIS AURANTIACA | 5( T) | -( -) | -( -) | -( -) | 2( T) | 1( T) | -( -) | -( -) | -( -) | -( -) | 2( T) |
| AGOSERIS GLAUCA | -( -) | -( -) | 9( T) | -( -) | 3( T) | 7( T) | 4( T) | -( -) | 17( T) | 33( 1) | 6( 1) |
| ALLIUM BREVISTYLUM | -( -) | -( -) | -( -) | -( -) | 6( T) | -( -) | 3( T) | -( -) | -( -) | -( -) | -( -) |
| ANGELICA PINNATA | -( -) | -( -) | -( -) | -( -) | 2( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ANTENNARIA MICROPHYLLA | 10( T) | 25( T) | -( -) | 9( T) | 1( T) | 8( 3) | 8( T) | -( -) | 28( 1) | -( -) | 6( 3) |
| APOCYNUM ANDROSAEMIFOLIUM | -( -) | -( -) | -( -) | -( -) | +( 2) | 6( 5) | 3(12) | -( -) | -( -) | -( -) | 3( T) |
| AQUILEGIA COERULEA | 10( T) | -( -) | 45( 1) | 18( 2) | 16( 1) | 8( T) | 4( 1) | 43( T) | -( -) | -( -) | 12( T) |
| AQUILEGIA FORMOSA | 5( T) | -( -) | -( -) | -( -) | 9( 5) | 1( 1) | 4( 1) | -( -) | -( -) | -( -) | 3( 4) |
| ARNICA CORDIFOLIA | 10( 5) | 75( 6) | -( -) | 55( 6) | 3( 9) | 18( 7) | 18( 9) | -( -) | 6(35) | -( -) | 3( 1) |
| ARNICA LATIFOLIA | 5( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| ARTEMISIA LUDOVICIANA | -( -) | -( -) | 18( 3) | -( -) | 1(14) | 1( 3) | 4( 2) | 14( T) | -( -) | -( -) | 3(13) |
| ASTER CHILENSIS | -( -) | -( -) | -( -) | -( -) | 3( 2) | 5( 1) | -( -) | -( -) | -( -) | -( -) | 8( 2) |
| ASTER ENGELMANNII | -( -) | 50( T) | 27( T) | 9( T) | 20( 4) | 8( 2) | 20( 1) | -( -) | 6( 1) | -( -) | 11( 1) |
| ASTER FOLIACEUS | 5( 2) | -( -) | -( -) | -( -) | 7( 3) | 13( 2) | 3( T) | -( -) | -( -) | -( -) | -( -) |
| ASTER PERELEGANS | -( -) | -( -) | -( -) | -( -) | 5( 1) | 6( 1) | 6( T) | -( -) | -( -) | 50( T) | 2( 2) |
| ASTRAGALUS MISER | 20( 3) | 25( T) | -( -) | 27(15) | 2( 3) | 17( 7) | 9( 1) | -( -) | 17(13) | -( -) | 14(10) |
| BALSAMORHIZA MACROPHYLLA | -( -) | -( -) | -( -) | -( -) | 1( 9) | 1( T) | 5( 6) | -( -) | -( -) | -( -) | -( -) |
| BALSAMORHIZA SAGITTATA | -( -) | -( -) | -( -) | 9( 1) | 2( 2) | 1( 1) | 6( 4) | -( -) | -( -) | 33(34) | 3( 2) |
| CALOCHORTUS NUTTALLII | 15( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| CAMPANULA ROTUNDIFOLIA | -( -) | 25( T) | -( -) | 9( 5) | -( -) | 7( T) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| CASTILLEJA LINARIAEFOLIA | -( -) | 50( 8) | -( -) | 9( T) | 1( T) | 8( T) | 1( 2) | -( -) | -( -) | -( -) | 2( T) |
| CASTILLEJA MINIATA | 15( T) | 25( 2) | -( -) | 9( T) | 12( 1) | 9( 1) | 9( 2) | 29( T) | 28( T) | -( -) | 8( 2) |
| CIRSIUM ARVENSE | 5( T) | -( -) | -( -) | 18( T) | -( -) | 2( T) | 3( T) | 14( T) | 11( 1) | -( -) | 6( 1) |
| CIRSIUM VULGARE | 5( T) | -( -) | -( -) | -( -) | 1( 2) | -( -) | 3( T) | -( -) | -( -) | -( -) | 2( T) |
| CLAYTONIA LANCEOLATA | 5( T) | -( -) | 18( 1) | -( -) | 2( 7) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| CORALLORHIZA MACULATA | 5( T) | -( -) | -( -) | -( -) | 4( T) | 3( T) | 6( T) | -( -) | 6( T) | 50( T) | 3( T) |
| CREPIS ACUMINATA | -( -) | -( -) | -( -) | -( -) | +( T) | 1( T) | 5( T) | -( -) | 22( T) | 17( T) | 9( T) |
| DELPHINIUM NUTTALLIANUM | 10( T) | -( -) | -( -) | -( -) | 9( 1) | 7( T) | 1( T) | -( -) | -( -) | -( -) | 9( 1) |
| DELPHINIUM OCCIDENTALE + | -( -) | -( -) | 55( 4) | 9( 4) | 20( 5) | 3( T) | 6( 1) | 14( T) | -( -) | -( -) | 6( T) |
| DISPORUM TRACHYCARPUM | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) | -( -) |
| EPILOBIUM ANGUSTIFOLIUM | -( -) | 25( 3) | -( -) | 64( 5) | 7( 3) | 24(10) | 8( 6) | -( -) | 6( T) | -( -) | 3( T) |
| ERIGERON FLAGELLARIS | 10( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 2( T) |
| ERIGERON PEREGRINUS | -( -) | -( -) | -( -) | -( -) | +( 1) | -( -) | 1( 3) | -( -) | -( -) | -( -) | -( -) |
| ERIGERON SPECIOSUS | 15( 2) | 25( T) | -( -) | -( -) | 23( 2) | 22( 1) | 16( 5) | -( -) | 6( T) | -( -) | 14( 1) |
| FRAGARIA VESCA + | 25( T) | 25( T) | 9( T) | 82(14) | 15( 3) | 33( 3) | 25( 2) | 14( T) | 11( T) | -( -) | 15( 1) |
| FRASERA SPECIOSA | 15( 3) | -( -) | 9( T) | 36( 2) | 8( 1) | 33( 2) | 18( 1) | 14( T) | 17( 2) | -( -) | 18( T) |
| FRITILLARIA ATROPURPUREA | 5( T) | -( -) | -( -) | -( -) | +( T) | 2( T) | 3( T) | -( -) | 6( T) | -( -) | 2( T) |
| GALIUM BOREALE | 20( 2) | 25( T) | -( -) | 45(30) | 10( 1) | 32( 3) | 20( 1) | -( -) | 6( 1) | -( -) | 14( 1) |
| GERANIUM RICHARDSONII | 5( T) | -( -) | -( -) | -( -) | 5(11) | 5( 3) | 3( 1) | -( -) | 6( 3) | -( -) | 2( T) |
| GERANIUM VISCOSISSIMUM + | 30( 2) | 75( 4) | 9(10) | 100(15) | 41( 6) | 80(11) | 71(10) | -( -) | 28( T) | 100( 2) | 41( 1) |
| HABENARIA UNALASCENSIS | -( -) | -( -) | -( -) | -( -) | 1( T) | 9( T) | 8( T) | -( -) | -( -) | -( -) | 6( T) |
| HACKELIA FLORIBUNDA | -( -) | 25( 3) | 45( 2) | -( -) | 55( 5) | 9( 1) | 25( 3) | -( -) | -( -) | 83( 3) | 21( 1) |
| HACKELIA PATENS | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( 1) | -( -) | -( -) | -( -) | 2( 3) |
| HEDYSARUM BOREALE | -( -) | -( -) | -( -) | 9(20) | -( -) | 3( 3) | 4( 1) | -( -) | -( -) | -( -) | -( -) |
| HELENIUM HOOPESII | 10( T) | -( -) | 9( T) | -( -) | 1( 3) | 6( 2) | 3( 1) | 29( T) | 6( 2) | -( -) | -( -) |
| HELIANTHELLA UNIFLORA | -( -) | -( -) | -( -) | 9( T) | 3( 2) | 10( 2) | 6( 4) | -( -) | -( -) | 33( 1) | 3( 2) |
| HERACLEUM LANATUM | -( -) | -( -) | 9( 3) | -( -) | 8( 4) | 1( T) | -( -) | -( -) | -( -) | -( -) | -( -) |
| HIERACIUM ALBIFLORUM | -( -) | 25( T) | -( -) | 9( 2) | 1( T) | 1( T) | -( -) | -( -) | -( -) | -( -) | 3( T) |
| HIERACIUM CYNOGLOSSOIDES | -( -) | -( -) | -( -) | -( -) | 1( T) | 19( T) | 4( T) | -( -) | -( -) | -( -) | -( -) |
| HYDROPHYLLUM CAPITATUM | -( -) | -( -) | 18( 1) | -( -) | 18( 1) | 1( T) | 19( 2) | -( -) | 6( T) | 17( T) | 11( 1) |
| LATHYRUS LANSZWERTII | 5(23) | 50( 5) | -( -) | -( -) | 31(15) | 2(35) | 9(29) | 43(18) | -( -) | -( -) | 15(14) |
| LATHYRUS LEUCANTHUS | 10(26) | -( -) | 9(15) | -( -) | 7(13) | 14(35) | 5(25) | 57(16) | 6( T) | -( -) | 12(11) |
| LATHYRUS PAUCIFLORUS | -( -) | -( -) | 18( 2) | -( -) | 6( 3) | -( -) | 3( 2) | -( -) | -( -) | -( -) | 5( 2) |
| LIGUSTICUM FILICINUM | -( -) | -( -) | 18( T) | -( -) | 3( 1) | 1( T) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| LUPINUS ARGENTEUS | 25( 5) | 50( 1) | -( -) | 82( 8) | 15( 7) | 70( 6) | 24( 7) | 14( T) | 67( 8) | -( -) | 12( 7) |
| LUPINUS CAUDATUS | -( -) | -( -) | -( -) | -( -) | 2( 2) | -( -) | 6( 1) | -( -) | -( -) | 17( T) | 14( 1) |
| LUPINUS LAXIFLORUS | -( -) | -( -) | -( -) | -( -) | 5( 3) | -( -) | 8( 3) | -( -) | -( -) | 17( 5) | 8( 2) |
| LUPINUS SERICEUS | -( -) | -( -) | -( -) | -( -) | +( 2) | -( -) | -( -) | -( -) | 28( 7) | -( -) | 11( 5) |
| MERTENSIA ARIZONICA + | -( -) | 25( 5) | 55(16) | -( -) | 29( 8) | 9( 2) | 5( 2) | 14( T) | -( -) | -( -) | 8( 2) |
| MERTENSIA LONGIFLORA | -( -) | -( -) | -( -) | -( -) | +( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| OSMORHIZA CHILENSIS + | 35( 2) | 50( 1) | 55( 1) | 64( 2) | 49( 4) | 52( 6) | 53( 9) | 14( T) | 6( 2) | 67( 3) | 24( 1) |
| OSMORHIZA OCCIDENTALIS | 5( 3) | 25( T) | 73( 8) | -( -) | 36( 8) | 8( 1) | 11( 2) | -( -) | -( -) | 17( 2) | 17( 1) |
| PAEONIA BROWNII | -( -) | -( -) | -( -) | -( -) | 2( 1) | 1( T) | 4( 1) | -( -) | -( -) | 17( T) | 3( 1) |
| PENSTEMON PROCERUS | -( -) | -( -) | -( -) | -( -) | -( -) | 1( 4) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| PENSTEMON WATSONI | -( -) | -( -) | -( -) | -( -) | 4( 2) | -( -) | 8( 1) | 14( 2) | 6( T) | -( -) | 23( 2) |

(con.)

# APPENDIX F (Con.)

| | POTR/ POPR | POTR/ RUPA | POTR/ SARA | POTR/ SHCA | POTR/ SYOR/ TALL FORB | POTR/ SYOR/ CARU | POTR/ SYOR/ THFE | POTR/ SYOR/ FETH | POTR/ SYOR/ CARO | POTR/ SYOR/ WYAM | POTR/ SYOR/ BRCA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 20 | 4 | 11 | 11 | 205 | 88 | 79 | 7 | 18 | 6 | 66 |
| PERIDERIDIA GAIRDNERI | -( -) | -( -) | -( -) | -( -) | 6( 1) | 31( 1) | 8( 1) | -( -) | -( -) | -( -) | 2( T) |
| PHACELIA HETEROPHYLLA | 5( T) | -( -) | -( -) | -( -) | 20( 1) | 1( T) | 6( T) | 14( T) | -( -) | -( -) | 6( T) |
| POLEMONIUM FOLIOSISSIMUM + | -( -) | -( -) | 82( 3) | -( -) | 23( 1) | 1( T) | 3( T) | -( -) | -( -) | 17( T) | 9( 1) |
| POTENTILLA GLANDULOSA | 10( T) | 25( 3) | -( -) | 55( 7) | 16( 1) | 42( 2) | 23( 1) | -( -) | 22( 1) | 50( T) | 11( T) |
| POTENTILLA GRACILIS | 25( T) | -( -) | -( -) | 36( 1) | 10( 1) | 15( 2) | 14( 1) | 29( T) | 17( 1) | -( -) | 8( T) |
| PTERIDIUM AQUILINUM | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 2(10) |
| RANUNCULUS INAMOENUS | 20( T) | -( -) | 18( T) | -( -) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) | 2( T) |
| RUDBECKIA OCCIDENTALIS | 10( 1) | -( -) | 45(12) | -( -) | 56(13) | 5( T) | 13( 1) | -( -) | -( -) | -( -) | 15( 2) |
| SCROPHULARIA LANCEOLATA | -( -) | -( -) | 9( T) | -( -) | 13( 1) | -( -) | 4( T) | -( -) | -( -) | -( -) | 5( T) |
| SENECIO CRASSULUS | 5( 2) | -( -) | -( -) | -( -) | 1( 7) | 1( T) | -( -) | 14( 1) | -( -) | -( -) | -( -) |
| SENECIO CYMBALARIOIDES | 5( T) | 25( T) | -( -) | -( -) | 13( T) | 5( T) | 8( 3) | -( -) | -( -) | -( -) | 6( 1) |
| SENECIO INTEGERRIMUS | 10( T) | -( -) | -( -) | -( -) | 3( T) | 1( T) | 5( 1) | -( -) | -( -) | 17( T) | 3( T) |
| SENECIO SERRA + | 5( T) | -( -) | 45( 4) | 27( T) | 58( 5) | 14( 2) | 11( 1) | -( -) | -( -) | 83( 3) | 12( 1) |
| SENECIO STREPTANTHIFOLIUS | -( -) | 25( T) | -( -) | 18( T) | 1( T) | -( -) | 1( 1) | -( -) | -( -) | -( -) | -( -) |
| SIDALCEA OREGANA | 10( T) | -( -) | -( -) | -( -) | 4( T) | 1( T) | 3( T) | -( -) | -( -) | 17( T) | 5( T) |
| SILENE MENZIESII | -( -) | -( -) | -( -) | 18( T) | 4( 1) | 11( 1) | 9( 1) | -( -) | -( -) | -( -) | -( -) |
| SMILACINA RACEMOSA | -( -) | -( -) | -( -) | -( -) | 9( 1) | 7( 1) | 9( 1) | -( -) | -( -) | 17( 5) | -( -) |
| SMILACINA STELLATA | 15( 1) | -( -) | 18( T) | 9( T) | 15( 3) | 35( 2) | 28( 3) | 43( 1) | 17( 1) | -( -) | 14( 1) |
| STELLARIA JAMESIANA | 10( 1) | 50( T) | 45( 6) | 9( T) | 46( 2) | 8( 1) | 27( 2) | 29( 3) | 33( T) | 67( 1) | 39( 3) |
| TARAXACUM OFFICINALE | 95( 7) | -( -) | 27( 2) | 45( 1) | 32( 1) | 61( 3) | 54( 3) | 100( 3) | 83( 4) | 67( 1) | 52( 2) |
| THALICTRUM FENDLERI + | 40( 1) | 25( 4) | 73(13) | 82(11) | 58(11) | 57(10) | 59(16) | 71( 3) | 17( 2) | 33(13) | 33( 2) |
| THERMOPSIS MONTANA | 15( 1) | -( -) | -( -) | -( -) | 1( 2) | 5( 6) | 1(10) | -( -) | -( -) | -( -) | 2( 1) |
| TRAGOPOGON DUBIUS | 5( T) | -( -) | -( -) | -( -) | 3( T) | 3( T) | 5( 1) | -( -) | -( -) | -( -) | 11( T) |
| TRIFOLIUM LONGIPES | 25( 5) | -( -) | -( -) | -( -) | +(10) | 1( 1) | -( -) | -( -) | 6( T) | -( -) | -( -) |
| URTICA DIOICA | 5( T) | -( -) | 18( T) | -( -) | +( T) | 1( T) | 3( T) | -( -) | -( -) | -( -) | -( -) |
| VALERIANA OCCIDENTALIS | 15( 1) | 25( T) | 55( 8) | 55( 4) | 55( 6) | 13( 2) | 16( 3) | -( -) | -( -) | 33( 1) | 8( 2) |
| VERATRUM CALIFORNICUM | -( -) | -( -) | -( -) | -( -) | 1( 2) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| VERBASCUM THAPSUS | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) | -( -) | -( -) | 2( T) |
| VICIA AMERICANA | 30( 2) | 25( 5) | 36( 2) | -( -) | 23( 7) | 10( 9) | 8( 5) | 86( 6) | 6(10) | -( -) | 20( 4) |
| VIGUIERA MULTIFLORA | -( -) | -( -) | -( -) | -( -) | 9( 5) | 1( T) | -( -) | -( -) | 17( T) | -( -) | 5( T) |
| VIOLA ADUNCA | 20( 1) | -( -) | 18( T) | 27( T) | 5( 1) | 14( 2) | 8( 2) | -( -) | -( -) | -( -) | 14( 2) |
| VIOLA NUTTALLII | 10( 2) | -( -) | 27( 1) | -( -) | 12( 3) | 2( T) | 18( 3) | -( -) | -( -) | 50( 4) | 24( 2) |
| VIOLA PURPUREA | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) | 4( 1) | -( -) | 6( T) | 17( 2) | 3( T) |
| WYETHIA AMPLEXICAULIS | -( -) | -( -) | -( -) | 9( T) | 2( 1) | 2( T) | -( -) | -( -) | -( -) | 100(29) | 3( T) |
| ANNUALS | | | | | | | | | | | |
| ANDROSACE SEPTENTRIONALIS | -( -) | -( -) | 9( T) | -( -) | 1( 1) | 1( T) | 3( T) | -( -) | 6( T) | -( -) | 5( T) |
| CHENOPODIUM FREMONTII | -( -) | 25( T) | 27( T) | -( -) | 6( 1) | 1( T) | 1( T) | 14( T) | -( -) | -( -) | 3( T) |
| COLLINSIA PARVIFLORA | 10( T) | -( -) | -( -) | -( -) | 9( 8) | 3( 1) | 8( 6) | -( -) | -( -) | 17(10) | 8( 2) |
| COLLOMIA LINEARIS | 5( T) | 25( T) | 36( 2) | -( -) | 22( 3) | 5( 2) | 3( 1) | -( -) | 6( T) | -( -) | 21( 1) |
| DESCURAINIA RICHARDSONII | 20( T) | -( -) | 64( 1) | -( -) | 32( 1) | 3( T) | 11( T) | 57( T) | 11( 1) | 33( T) | 35( T) |
| GALIUM APARINE | -( -) | -( -) | -( -) | -( -) | +( T) | 2( 9) | 1( 3) | -( -) | -( -) | -( -) | -( -) |
| GALIUM BIFOLIUM | 10(10) | -( -) | 45(14) | 9(10) | 27( 3) | 5( 3) | 13( 4) | -( -) | -( -) | 83( 5) | 9( 3) |
| MADIA GLOMERATA | -( -) | -( -) | -( -) | -( -) | +( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| NEMOPHILA BREVIFLORA | -( -) | -( -) | 27(11) | -( -) | 35(17) | 3(12) | 20(11) | -( -) | -( -) | 83( 7) | 6(14) |
| POLYGONUM DOUGLASII | 10( T) | -( -) | 45( 2) | -( -) | 23( 7) | 3( 8) | 5( T) | -( -) | 6( T) | 17( 2) | 18( 3) |

(con.)

# APPENDIX F (Con.)

| | POTR/ SYOR/ POPR | POTR/ JUCO/ CAGE | POTR/ JUCO/ LUAR | POTR/ JUCO/ ASMI | POTR/ ARTR | POTR/ SASC | POTR/ AMAL- SYOR/ TALL FORB | POTR/ AMAL- SYOR/ THFE | POTR/ AMAL- SYOR/ CARU | POTR/ AMAL- SYOR/ BRCA | POTR/ AMAL/ PTAQ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 36 | 23 | 14 | 14 | 27 | 13 | 96 | 40 | 68 | 21 | 10 |
| **TREES** | | | | | | | | | | | |
| ABIES CONCOLOR | 6( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 13( 2) | 3( T) | -( -) | 14( 1) | 30( 3) |
| ABIES LASIOCARPA | 11( 3) | 13( T) | -( -) | 21( 4) | -( -) | -( -) | 6( 4) | 20( 1) | 15( T) | 19( 1) | 10( 1) |
| PICEA ENGELMANNII | 6( 3) | 17( 2) | 7( 1) | 14( 1) | 4( T) | -( -) | -( -) | 3( T) | 1( 1) | -( -) | -( -) |
| PICEA PUNGENS | 3( 1) | 4( T) | 21( T) | 14( 3) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| PINUS CONTORTA | -( -) | 26( 2) | 21( T) | 36( 3) | 26( 1) | -( -) | 1( 4) | 8( 3) | 9( 3) | 10( 2) | -( -) |
| PINUS FLEXILIS | -( -) | 4( T) | 14( 1) | 7( 2) | 11( T) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| PINUS PONDEROSA | 17( 3) | 4( 1) | 7( T) | 14( 4) | 4( 6) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) |
| POPULUS TREMULOIDES | 100(69) | 100(76) | 100(72) | 100(74) | 100(60) | 100(61) | 100(71) | 100(73) | 100(75) | 100(68) | 100(68) |
| POPULUS TREMULOIDES (reprod.) | 78( 3) | 65( 3) | 79( 6) | 79( 5) | 85( 3) | 77( 4) | 78( 5) | 68( 7) | 87( 5) | 67( 8) | 90( 3) |
| PSEUDOTSUGA MENZIESII | 11( 1) | 26( 1) | 21( 1) | 43( 2) | 4( 1) | -( -) | 7( 2) | 30( 1) | 32( 2) | 14( 1) | -( -) |
| **SHRUBS** | | | | | | | | | | | |
| ACER GLABRUM | -( -) | -( -) | -( -) | 7( 2) | -( -) | 8( T) | 2( T) | 3( T) | 3( 3) | -( -) | 10( T) |
| ACER GRANDIDENTATUM | 11( 1) | -( -) | -( -) | -( -) | 4( T) | 15( 6) | 24(17) | 18( 3) | 15( 6) | 48(23) | 90(17) |
| AMELANCHIER ALNIFOLIA | 25( 2) | 17( 2) | 36( 2) | 29( 2) | 15( 1) | 62( 9) | 80(13) | 83(13) | 93(23) | 95( 9) | 60( 6) |
| ARCTOSTAPHYLOS UVA-URSI | -( -) | 22( 5) | 29( 9) | 36( 4) | 4(25) | -( -) | -( -) | -( -) | 3( 2) | -( -) | -( -) |
| ARTEMISIA TRIDENTATA | 19( 1) | 22( 1) | 43( 1) | 43( 3) | 100(21) | -( -) | 3( 4) | 8( T) | 1( 1) | 10(13) | -( -) |
| BERBERIS REPENS | 39( 1) | 52( 6) | 79(15) | 64(11) | 33( 3) | 23( 5) | 41( 6) | 63( 6) | 75( 6) | 76( 9) | 40(22) |
| CEANOTHUS VELUTINUS | 3( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 2( 3) | 10( 2) | 15( 7) | 5(20) | -( -) |
| CERCOCARPUS LEDIFOLIUS | 6( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | 1( 5) | 3( 3) | -( -) | -( -) | -( -) |
| CHRYSOTHAMNUS VISCIDIFLORUS | 3( T) | -( -) | -( -) | -( -) | 15( T) | -( -) | -( -) | 3( T) | -( -) | -( -) | -( -) |
| JUNIPERUS COMMUNIS | 8( 1) | 100(24) | 100(20) | 100(28) | 33(09) | -( -) | -( -) | 3( 2) | 4( 2) | 5( 2) | -( -) |
| LONICERA INVOLUCRATA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 1( 2) | 3( T) | 3( T) | -( -) | -( -) |
| PACHISTIMA MYRSINITES | 3( T) | 9( T) | 7(30) | 14( 2) | 4( T) | 15(26) | 17(20) | 38( 6) | 53(21) | 29( 4) | 10( 1) |
| PHYSOCARPUS MALVACEUS | -( -) | -( -) | -( -) | -( -) | -( -) | 8( 5) | 5(18) | 5(20) | 6(10) | 14( 8) | 20(11) |
| PRUNUS VIRGINIANA | 19( 1) | -( -) | -( -) | -( -) | 11( T) | 38( 8) | 81(22) | 78(19) | 79(17) | 67(16) | 90(10) |
| QUERCUS GAMBELII | 22( 5) | -( -) | -( -) | -( -) | 4( T) | -( -) | 5( 3) | 10( 3) | -( -) | 19( 3) | 10(10) |
| RIBES CEREUM | -( -) | -( -) | -( -) | -( -) | 7( T) | 23( 2) | 10( 4) | 8( 1) | -( -) | -( -) | -( -) |
| RIBES INERME | -( -) | -( -) | -( -) | -( -) | -( -) | 8( 2) | 4( 5) | -( -) | -( -) | -( -) | -( -) |
| RIBES LACUSTRE | 6( 3) | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| RIBES VISCOSISSIMUM | -( -) | -( -) | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) |
| ROSA WOODSII + | 39(10) | 39( 1) | 50( 1) | 57( 2) | 22( 2) | 62( 6) | 57( 5) | 80( 6) | 88( 6) | 76( 2) | 60( 2) |
| RUBUS PARVIFLORUS | -( -) | -( -) | -( -) | -( -) | -( -) | 31( 8) | 1( T) | 5(16) | -( -) | -( -) | 10( T) |
| SALIX SCOULERIANA | 3( 3) | -( -) | -( -) | -( -) | -( -) | 100(24) | 4( 3) | 5( 1) | 12( 3) | -( -) | -( -) |
| SAMBUCUS RACEMOSA + | 3( T) | -( -) | -( -) | -( -) | 4( T) | -( -) | 14( 1) | 5( 2) | -( -) | 5( T) | 20( 2) |
| SHEPHERDIA CANADENSIS | -( -) | 4( T) | 7( T) | -( -) | -( -) | 15( 3) | 2( 1) | 13( 3) | 6( 7) | 5(15) | -( -) |
| SORBUS SCOPULINA | -( -) | -( -) | -( -) | -( -) | -( -) | 15(18) | 5( 8) | 3( T) | 10( 1) | -( -) | -( -) |
| SPIRAEA BETULIFOLIA | -( -) | -( -) | -( -) | -( -) | -( -) | 8( T) | 2(38) | 8(25) | 22(31) | 5( T) | -( -) |
| SYMPHORICARPOS ALBUS | -( -) | 4(20) | -( -) | -( -) | -( -) | -( -) | 4( 8) | 15(32) | 54(18) | -( -) | -( -) |
| SYMPHORICARPOS OREOPHILUS | 100(32) | 78( 8) | 79(13) | 71( 5) | 81( 8) | 77( 9) | 97(27) | 80(20) | 40(17) | 100(26) | 60( 7) |
| **GRAMINOIDS** | | | | | | | | | | | |
| AGROPYRON SPICATUM | -( -) | 9( 4) | -( -) | -( -) | 7( T) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) |
| AGROPYRON TRACHYCAULUM + | 50( 1) | 61( 2) | 57( 4) | 64( 3) | 67( 6) | 23( 2) | 39( 2) | 38( 2) | 26( 1) | 57( 6) | 50( T) |
| BROMUS ANOMALUS | 3( T) | 4( T) | 21(28) | 7( T) | 19( 5) | -( -) | 2(20) | -( -) | 3( T) | -( -) | -( -) |
| BROMUS CARINATUS + | 33( 1) | 30( 2) | 7( 2) | -( -) | 22( 4) | 54( 7) | 53( 6) | 45( 6) | 25( 1) | 52( 8) | 60( 7) |
| BROMUS CILIATUS | 8( 1) | 35( 3) | 7( T) | 29( 2) | 11( 9) | -( -) | 5( 3) | 5( 4) | 10( T) | -( -) | -( -) |
| CALAMAGROSTIS RUBESCENS | -( -) | 4(38) | -( -) | -( -) | -( -) | 8(10) | 16(18) | 28( 7) | 93(41) | 10( 3) | -( -) |
| CAREX GEYERI | 3( 5) | 96(31) | 29( 4) | 21( 3) | 11(25) | -( -) | 15( 2) | 18( 2) | 24(34) | 10( 4) | -( -) |
| CAREX HOODII | 19( 1) | -( -) | -( -) | 7( T) | 11( T) | 15( 3) | 30( 2) | 15( 2) | 13( 2) | 14( 2) | -( -) |
| CAREX ROSSII | 8( 1) | 9( 3) | 7( T) | 14( 1) | 26(14) | -( -) | 2( T) | 3( 1) | -( -) | -( -) | -( -) |
| DACTYLIS GLOMERATA | 19( 5) | 4( T) | -( -) | -( -) | 4( T) | -( -) | 4( 5) | 3( T) | -( -) | 10(10) | 10( T) |
| ELYMUS CINEREUS | 8( 4) | -( -) | -( -) | -( -) | 7( 1) | -( -) | 10( 1) | 5( 2) | 1( 3) | 10( 2) | -( -) |
| ELYMUS GLAUCUS | 17( 1) | 9( 2) | 7( T) | 14(19) | 4( 5) | 62(10) | 75(12) | 63(11) | 84( 6) | 71(13) | 80(17) |
| FESTUCA IDAHOENSIS + | 6( 3) | 4( T) | 21( 6) | 7( 5) | 15( 5) | -( -) | 2( T) | 3( 1) | 3( T) | 5( 2) | -( -) |
| FESTUCA THURBERI | 8( T) | -( -) | -( -) | -( -) | ( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| HORDEUM JUBATUM | -( -) | -( -) | 7( T) | -( -) | 4( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| KOELERIA CRISTATA | -( -) | 4( 1) | -( -) | -( -) | 15( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| LEUCOPOA KINGII | -( -) | -( -) | -( -) | 43( 6) | 26( 3) | -( -) | 1( 3) | -( -) | -( -) | -( -) | -( -) |
| MELICA SPECTABILIS | 6( T) | -( -) | -( -) | -( -) | 19( 4) | 15( 1) | 18( 1) | 5( 2) | 10( T) | 10(20) | -( -) |
| PHLEUM ALPINUM | 3( T) | 4( 3) | -( -) | 7( T) | -( -) | -( -) | 2(19) | 3( T) | 9(22) | -( -) | -( -) |
| PHLEUM PRATENSE | 3( T) | 4( T) | -( -) | 7( 3) | -( -) | -( -) | 3( T) | 8( 1) | 9( 2) | 10( 1) | 10( T) |
| POA AMPLA | -( -) | 17( T) | 14( 1) | -( -) | 7( 5) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| POA FENDLERIANA | 6( T) | -( -) | 21(38) | 14( T) | 15( 8) | -( -) | -( -) | -( -) | -( -) | 5(10) | -( -) |
| POA NERVOSA | 3( 5) | 4( 3) | 7( 2) | 14( 1) | 26( 5) | -( -) | 13( 2) | 13( 2) | 1( T) | 10( 5) | 10( T) |
| POA PALUSTRIS | -( -) | 13( 1) | -( -) | -( -) | -( -) | -( -) | 2( T) | -( -) | 6( 1) | -( -) | -( -) |
| POA PRATENSIS | 100(35) | 39(14) | 21(11) | 21( 2) | 22( 3) | 31( 5) | 38(16) | 40(19) | 25( 3) | 52(27) | 30( 1) |
| SITANION HYSTRIX | 11( T) | -( -) | 21( 2) | 14( 1) | 15( 2) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| STIPA COMATA | 3( T) | -( -) | 14( 6) | 21( 3) | 22( 8) | -( -) | -( -) | -( -) | -( -) | -( -) | -( ) |
| STIPA OCCIDENTALIS + | 22( 4) | 83( 6) | 50( 7) | 43( 4) | 44( 8) | -( -) | 7( 1) | 18( 4) | 3( 2) | 14(14) | 10( T) |
| TRISETUM SPICATUM | -( -) | 13( T) | -( -) | 14( 3) | 4( 5) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |

(con.)

# APPENDIX F (Con.)

| | POTR/ SYOR/ POPR | POTR/ JUCO/ CAGE | POTR/ JUCO/ LUAR | POTR/ JUCO/ ASMI | POTR/ ARTR | POTR/ SASC | POTR/ AMAL- SYOR/ TALL FORB | POTR/ AMAL- SYOR/ THFE | POTR/ AMAL- SYOR/ CARU | POTR/ AMAL- SYOR/ BRCA | POTR/ AMAL/ PTAQ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 36 | 23 | 14 | 14 | 27 | 13 | 96 | 40 | 68 | 21 | 10 |
| FORBS | | | | | | | | | | | |
| ACHILLEA MILLEFOLIUM | 78( 2) | 74( 2) | 36( 1) | 93( 2) | 33( 2) | 31( 2) | 52( 2) | 45( 1) | 62( 2) | 43( 1) | 10( T) |
| ACONITUM COLUMBIANUM | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| ACTAEA RUBRA | -( -) | -( -) | -( -) | -( -) | -( -) | 23( 1) | 2( T) | -( -) | 3( T) | -( -) | 10( 1) |
| AGASTACHE URTICIFOLIA | 25( 2) | -( -) | -( -) | -( -) | 7(10) | 54( 3) | 73( 7) | 35( 1) | 10( 1) | 43( 1) | 40( 6) |
| AGOSERIS AURANTIACA | 3( 2) | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | 3( T) | 3( T) | -( -) | -( -) |
| AGOSERIS GLAUCA | 8( T) | 17( T) | 7( T) | 29( T) | 15( T) | -( -) | 5( T) | -( -) | 10( T) | 5( T) | -( -) |
| ALLIUM BREVISTYLUM | 3( T) | -( -) | 7( T) | 7( T) | -( -) | -( -) | 5( T) | -( -) | -( -) | -( -) | -( -) |
| ANGELICA PINNATA | -( -) | -( -) | -( -) | 7( 3) | -( -) | 8( T) | 2( T) | 3( T) | -( -) | -( -) | -( -) |
| ANTENNARIA MICROPHYLLA | 17( T) | 61( 1) | 43( 5) | 36( 3) | 41( 5) | -( -) | -( -) | -( -) | -( -) | 5( T) | -( -) |
| APOCYNUM ANDROSAEMIFOLIUM | -( -) | -( -) | -( -) | 7( T) | 4( T) | -( -) | 5( 3) | 10( 1) | 10( T) | 5( T) | 10( T) |
| AQUILEGIA COERULEA | 3( T) | 13( 1) | 14( T) | 29( 1) | -( -) | -( -) | 5( T) | 3( 2) | -( -) | 5( T) | 20( T) |
| AQUILEGIA FORMOSA | 3( 1) | -( -) | -( -) | -( -) | -( -) | 23( 5) | 7( 7) | -( -) | -( -) | -( -) | -( -) |
| ARNICA CORDIFOLIA | -( -) | -( -) | 7( 1) | 7(10) | 4( T) | 38(10) | 7( 6) | 13(10) | 24( 8) | 10( 5) | -( -) |
| ARNICA LATIFOLIA | -( -) | -( -) | 7( T) | 14( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ARTEMISIA LUDOVICIANA | 3( T) | -( -) | -( -) | -( -) | -( -) | 8( 2) | 2( T) | 5( 2) | 1( T) | -( -) | -( -) |
| ASTER CHILENSIS | 8( 5) | 4( T) | -( -) | -( -) | 4( 2) | -( -) | 4( T) | 8( 1) | 6( 1) | -( -) | -( -) |
| ASTER ENGELMANNII | 6( T) | -( -) | -( -) | -( -) | -( -) | 15( 6) | 46( 6) | 25( 1) | 18( 2) | 38( 1) | 60( 2) |
| ASTER FOLIACEUS | 3( 5) | -( -) | -( -) | -( -) | -( -) | -( -) | 4( 1) | 10( 4) | 24( 2) | -( -) | -( -) |
| ASTER PERELEGANS | -( -) | -( -) | -( -) | 7( T) | 7( 8) | 8( T) | 6( 1) | 5( 1) | -( -) | 5( T) | -( -) |
| ASTRAGALUS MISER | 3( T) | 70(11) | 29( 8) | 100( 7) | 19( 7) | -( -) | 1( 3) | -( -) | 3( 2) | 5( 5) | -( -) |
| BALSAMORHIZA MACROPHYLLA | 3(10) | -( -) | -( -) | -( -) | -( -) | -( -) | 5( 4) | 3( 5) | 1( T) | -( -) | -( -) |
| BALSAMORHIZA SAGITTATA | -( -) | -( -) | -( -) | -( -) | 4( T) | 15( T) | 5( 1) | 10( 3) | 3( 1) | -( -) | -( -) |
| CALOCHORTUS NUTTALLII | 6( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) |
| CAMPANULA ROTUNDIFOLIA | 6( T) | 43( T) | 7( T) | 21( T) | 4( T) | -( -) | -( -) | 3( T) | 7( T) | -( -) | -( -) |
| CASTILLEJA LINARIAEFOLIA | 6( T) | -( -) | -( -) | 7( T) | -( -) | -( -) | -( -) | 8( T) | 15( T) | 5( T) | -( -) |
| CASTILLEJA MINIATA | 8( 1) | 30( 1) | 14( T) | 14( T) | 11( 1) | -( -) | 11( 1) | 8( T) | 9( 1) | 10( T) | -( -) |
| CIRSIUM ARVENSE | 6( T) | 4( T) | 7( T) | -( -) | -( -) | -( -) | 1( T) | 3( T) | 1( T) | -( -) | -( -) |
| CIRSIUM VULGARE | 3( 5) | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) | 5( T) | -( -) |
| CORALLORHIZA MACULATA | 6( T) | 4( T) | -( -) | 7( T) | -( -) | 31( T) | 4( 1) | 10( T) | 1( T) | -( -) | 10( T) |
| CREPIS ACUMINATA | -( -) | 4( T) | -( -) | -( -) | 15( T) | -( -) | 2( T) | -( -) | -( -) | -( -) | -( -) |
| DELPHINIUM NUTTALLIANUM | 28( 1) | 4( T) | -( -) | 7( T) | 7( T) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| DELPHINIUM OCCIDENTALE + | 3( T) | 9( 1) | -( -) | -( -) | -( -) | 15( T) | 20( 4) | 8( T) | 6( 1) | -( -) | 20( T) |
| DISPORUM TRACHYCARPUM | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 2( T) | 10( 1) | 13( 1) | -( -) | 20( T) |
| EPILOBIUM ANGUSTIFOLIUM | -( -) | 4( T) | 7( T) | -( -) | -( -) | 46( 7) | 17( 1) | 10( 2) | 35( 5) | -( -) | 10( T) |
| ERIGERON FLAGELLARIS | 6( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ERIGERON PEREGRINUS | -( -) | 13( 5) | 7( T) | 29( T) | 7( T) | -( -) | 1( 1) | -( -) | 1( 3) | -( -) | -( -) |
| ERIGERON SPECIOSUS | 8( T) | 30( 1) | 14( 3) | 21( 1) | 11( 7) | -( -) | 19( 1) | 23( 3) | 16( 1) | 10( 1) | -( -) |
| FRAGARIA VESCA + | 8( 5) | 4( T) | 14( 3) | 21( 2) | 11( 4) | -( -) | 18( 2) | 23( 2) | 31( 2) | 14( 2) | -( -) |
| FRASERA SPECIOSA | 11( T) | 26( T) | 7( T) | -( -) | -( -) | 15( 3) | 9( 2) | 15( T) | 15( 1) | 19( 2) | -( -) |
| FRITILLARIA ATROPURPUREA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | 3( T) | -( -) | -( -) |
| GALIUM BOREALE | 3( T) | 35( 1) | 14( T) | 57( 2) | 7( T) | 15( T) | 17( 3) | 15( T) | 29( 2) | 43( 1) | 50( 2) |
| GERANIUM RICHARDSONII | 3( 2) | 4( 5) | -( -) | 7( 3) | -( -) | -( -) | -( -) | 5( 2) | 1( 1) | -( -) | -( -) |
| GERANIUM VISCOSISSIMUM + | 28( 1) | 83(11) | 29( 1) | 57( 1) | 30( 1) | 23( 4) | 51( 4) | 80( 9) | 90( 8) | 57( 2) | 10( T) |
| HABENARIA UNALASCENSIS | -( -) | 9( T) | -( -) | 7( T) | -( -) | -( -) | 7( T) | 18( T) | 22( T) | 10( T) | -( -) |
| HACKELIA FLORIBUNDA | 28( 2) | 4( T) | -( -) | 7( T) | 11( 1) | 38( 5) | 47( 3) | 28( 1) | 1( T) | 19( T) | -( -) |
| HACKELIA PATENS | -( -) | -( -) | -( -) | -( -) | 4( 1) | -( -) | 2( 1) | -( -) | -( -) | -( -) | -( -) |
| HELENIUM HOOPESII | 22( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 5( T) | -( -) |
| HELIANTHELLA UNIFLORA | 3( T) | -( -) | -( -) | -( -) | 11( 4) | -( -) | 4( 1) | 13( 1) | 10( 1) | 10( T) | -( -) |
| HERACLEUM LANATUM | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 6( 9) | 3( T) | 1( T) | -( -) | 30( 6) |
| HIERACIUM ALBIFLORUM | -( -) | 4( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | 9( 1) | -( -) | -( -) |
| HIERACIUM CYNOGLOSSOIDES | 6( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 6( T) | 3( T) | 28( T) | 5( T) | -( -) |
| HYDROPHYLLUM CAPITATUM | 6( T) | -( -) | -( -) | -( -) | -( -) | 23( 2) | 10( 1) | 5( T) | 1( T) | 10( T) | 10( T) |
| LATHYRUS LANSZWERTII | 17(16) | 9( 8) | -( -) | -( -) | -( -) | 15(23) | 24( 5) | 3(15) | 1( 3) | 43(20) | 10( T) |
| LATHYRUS LEUCANTHUS | 28(17) | -( -) | -( -) | -( -) | -( -) | 8(25) | 11(14) | 5(15) | -( -) | 14(34) | 10(13) |
| LATHYRUS PAUCIFLORUS | 3( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 11( 8) | 5( 5) | -( -) | -( -) | 30( 3) |
| LIGUSTICUM FILICINUM | -( -) | -( -) | -( -) | 14( T) | -( -) | -( -) | 6(10) | 8( 2) | 4(17) | -( -) | -( -) |
| LUPINUS ARGENTEUS | 47( 3) | 57( 7) | 93(13) | 29( 1) | 33(11) | 8( 5) | 18( 5) | 43( 6) | 82( 8) | 48( 6) | 10( T) |
| LUPINUS CAUDATUS | 3( T) | -( -) | 7(30) | -( -) | 4( 2) | -( -) | 4( 1) | 8( 1) | -( -) | 5( 1) | -( -) |
| LUPINUS LAXIFLORUS | 3( 2) | -( -) | -( -) | -( -) | 11( 6) | 8( 3) | 3( 1) | -( -) | -( -) | -( -) | -( -) |
| LUPINUS SERICEUS | -( -) | -( -) | -( -) | -( -) | 26( 3) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| MERTENSIA ARIZONICA + | 8( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | 23( 3) | 13( T) | -( -) | 10( T) | 10( 5) |
| MERTENSIA LONGIFLORA | -( -) | -( -) | -( -) | -( -) | 4( T) | -( -) | 1( T) | -( -) | 1( T) | -( -) | -( -) |
| OSMORHIZA CHILENSIS + | 22( 1) | 39( 2) | -( -) | 21( 1) | 4( T) | 92(10) | 56( 5) | 55( 9) | 69( 8) | 43( 3) | 60( 4) |
| OSMORHIZA OCCIDENTALIS | 6( 4) | -( -) | -( -) | -( -) | -( -) | 31(14) | 35( 4) | 15( 2) | 7( T) | 10( 3) | 10( 5) |
| PAEONIA BROWNII | -( -) | -( -) | -( -) | -( -) | -( -) | 8( T) | 2( T) | 8( 2) | 3( T) | -( -) | -( -) |
| PENSTEMON PROCERUS | -( -) | -( -) | -( -) | -( -) | 7( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| PENSTEMON WATSONI | -( -) | -( -) | -( -) | -( -) | 22( 3) | 8( T) | 3( 1) | 8( 1) | -( -) | -( -) | -( -) |

(con.)

# APPENDIX F (Con.)

| | POTR/ SYOR/ POPR | POTR/ JUCO/ CAGE | POTR/ JUCO/ LUAR | POTR/ JUCO/ ASMI | POTR/ ARTR | POTR/ SASC | POTR/ AMAL- SYOR/ TALL FORB | POTR/ AMAL- SYOR/ THFE | POTR/ AMAL- SYOR/ CARU | POTR/ AMAL- SYOR/ BRCA | POTR/ AMAL/ PTAQ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 36 | 23 | 14 | 14 | 27 | 13 | 96 | 40 | 68 | 21 | 10 |
| PERIDERIDIA GAIRDNERI | -( -) | -( -) | 7( T) | -( -) | 4( T) | 8( 1) | 11( 1) | 13( T) | 51( 1) | 5( T) | -( -) |
| PHACELIA HETEROPHYLLA | 14( 1) | -( -) | -( -) | -( -) | 4( T) | 8( T) | 23( T) | 10( T) | 1( T) | 10( T) | 20( T) |
| POLEMONIUM FOLIOSISSIMUM + | 3( T) | -( -) | -( -) | -( -) | 4( T) | -( -) | 14( 1) | 5( T) | -( -) | 14( T) | 30( T) |
| POTENTILLA DIVERSIFOLIA | 6( T) | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| POTENTILLA GLANDULOSA | 11( 1) | 4( T) | -( -) | -( -) | 15( 1) | 8( 2) | 14( 1) | 18( 1) | 31( 1) | 10( T) | -( -) |
| POTENTILLA GRACILIS | 3( T) | 74( 2) | 29( T) | 43( T) | 7( T) | -( -) | 5( 1) | 5( 3) | 12( 2) | -( -) | -( -) |
| PTERIDIUM AQUILINUM | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 100(41) |
| RANUNCULUS INAMOENUS | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 5( T) | -( -) |
| RUDBECKIA OCCIDENTALIS | 11( 2) | 4( T) | -( -) | -( -) | -( -) | 8(25) | 32( 5) | 15( 2) | 3( 2) | 19( 2) | 30( 5) |
| SCROPHULARIA LANCEOLATA | -( -) | -( -) | -( -) | -( -) | -( -) | 8( 5) | 10( 1) | -( -) | 1( T) | 5( T) | 40( T) |
| SENECIO CRASSULUS | -( -) | 4( T) | -( -) | -( -) | -( -) | -( -) | 3( T) | 5( 5) | 4( 7) | -( -) | -( -) |
| SENECIO CYMBALARIOIDES | 14( 1) | -( -) | 7( 5) | 21( T) | 11( 7) | -( -) | 18( 1) | 5( 3) | 12( T) | 19( T) | -( -) |
| SENECIO INTEGERRIMUS | 8( T) | 9( T) | -( -) | -( -) | 15( 1) | -( -) | 6( 3) | 8( 1) | -( -) | -( -) | -( -) |
| SENECIO SERRA + | 17( 1) | -( -) | 7( 2) | -( -) | 4( 5) | 46( 4) | 52( 5) | 30( 1) | 12( 2) | 29( 1) | 30( 9) |
| SENECIO STREPTANTHIFOLIUS | -( -) | 4( T) | -( -) | -( -) | 7( 1) | -( -) | 1( T) | 3( T) | -( -) | 10( T) | -( -) |
| SIDALCEA OREGANA | 8( T) | -( -) | -( -) | -( -) | 4( T) | 8( 2) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| SILENE MENZIESII | -( -) | -( -) | 7( T) | -( -) | 7( T) | 8( 2) | 9( 2) | 5( T) | 19( 1) | 14( 1) | 20( T) |
| SMILACINA RACEMOSA | -( -) | -( -) | -( -) | -( -) | -( -) | 54( 6) | 15( 4) | 18( 1) | 31( 1) | 10( T) | 30( T) |
| SMILACINA STELLATA | 8( T) | 22( T) | 7(10) | 21( T) | 11( T) | 31( 1) | 19( 3) | 45( 3) | 43( 2) | 29( 7) | 50(17) |
| STELLARIA JAMESIANA | 28( T) | 61( 1) | -( -) | 7( 2) | 33( 2) | 38( 2) | 35( 4) | 8( 1) | 4( 1) | 24( 2) | 30( 1) |
| TARAXACUM OFFICINALE | 86( 4) | 83(11) | 50( 4) | 79( 4) | 59( 1) | 54( 2) | 34( 1) | 38( 2) | 57( 2) | 43( 1) | 30( T) |
| THALICTRUM FENDLERI + | 17( 1) | 26(11) | 43( 2) | 64( 2) | 22( 4) | 69(21) | 73(11) | 73(14) | 81(10) | 57( 2) | 50( 2) |
| THERMOPSIS MONTANA | 8( 5) | 4(10) | -( -) | -( -) | 4(25) | -( -) | 1( 2) | 3( 5) | -( -) | 5( 5) | 10( T) |
| TRAGOPOGON DUBIUS | 14( 1) | 4( T) | 7( T) | -( -) | -( -) | 8( T) | 1( T) | 10( T) | 9( T) | 10( T) | -( -) |
| TRIFOLIUM GYMNOCARPON | -( -) | -( -) | -( -) | 7( 7) | -( -) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| TRIFOLIUM LONGIPES | -( -) | 4( T) | 7( T) | 14( 2) | 7( 5) | -( -) | -( -) | -( -) | 1( 3) | -( -) | 10( T) |
| URTICA DIOICA | -( -) | -( -) | -( -) | -( -) | -( -) | 8( 1) | 1( 1) | -( -) | 1( T) | -( -) | 10(10) |
| VALERIANA OCCIDENTALIS | 8( T) | -( -) | -( -) | -( -) | -( -) | 38( 4) | 40( 4) | 13( 1) | 7( 3) | 14( 1) | 40( 3) |
| VERATRUM CALIFORNICUM | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 1( T) | -( -) | -( -) | -( -) | -( -) |
| VERBASCUM THAPSUS | 3( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | 5( T) | 1( T) | 5( T) | -( -) |
| VICIA AMERICANA | 42( 9) | -( -) | -( -) | -( -) | 4( T) | 8( T) | 24( 5) | 15( 5) | 1( T) | 19(21) | 40( 2) |
| VIGUIERA MULTIFLORA | 3( 3) | -( -) | -( -) | 7( 5) | 4( T) | -( -) | 4( T) | 5( 1) | 4( 1) | 5( T) | -( -) |
| VIOLA ADUNCA | 17( T) | 9( T) | -( -) | -( -) | 4( T) | 31( 2) | 10( 1) | 8( 1) | 15( T) | 19( 2) | 10( 2) |
| VIOLA NUTTALLII | 6( 1) | 13( 2) | -( -) | -( -) | -( -) | 23( 2) | 15( 3) | 10( 3) | 9( 1) | -( -) | 10( T) |
| VIOLA PURPUREA | -( -) | -( -) | -( -) | -( -) | 4( T) | -( -) | 4( 1) | 3( T) | -( -) | -( -) | -( -) |
| WYETHIA AMPLEXICAULIS | 3( T) | -( -) | -( -) | -( -) | -( -) | 8( 1) | 5( 3) | 3( T) | 6( T) | 5( T) | -( -) |
| ANNUALS | | | | | | | | | | | |
| ANDROSACE SEPTENTRIONALIS | -( -) | 9( T) | -( -) | -( -) | -( -) | -( -) | 2( T) | 3( T) | -( -) | -( -) | -( -) |
| CHENOPODIUM FREMONTII | 3( 2) | -( -) | 7( T) | -( -) | 4( T) | -( -) | 4( T) | 5( T) | 3( T) | -( -) | -( -) |
| COLLINSIA PARVIFLORA | 3(10) | -( -) | -( -) | 7( T) | 4( T) | 15( 2) | 7( 4) | 3( 3) | 13( 4) | -( -) | -( -) |
| COLLOMIA LINEARIS | 6( T) | -( -) | -( -) | -( -) | 7( 1) | 8( T) | 4( T) | 8( 7) | 6( 3) | -( -) | -( -) |
| DESCURAINIA RICHARDSONII | 28( 1) | -( -) | -( -) | -( -) | 11( T) | 23( T) | 27( 1) | 10( T) | -( -) | 14( T) | 40( 1) |
| GALIUM APARINE | -( -) | -( -) | -( -) | -( -) | -( -) | 15( 3) | 5( 4) | 3( 3) | -( -) | 10( T) | 10( 7) |
| GALIUM BIFOLIUM | 6( T) | -( -) | -( -) | -( -) | -( -) | 46( 3) | 21( 4) | 10( T) | 4( 8) | -( -) | 20( 2) |
| MADIA GLOMERATA | 3( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| NEMOPHILA BREVIFLORA | 14( 6) | -( -) | -( -) | -( -) | 4( 5) | 31(14) | 25(13) | 8(15) | 4(20) | 10( 3) | 40(13) |
| POLYGONUM DOUGLASII | 8( 1) | 13( T) | 14( T) | 7( T) | 7( 1) | -( -) | 21( 2) | 8( 4) | 10( 8) | 5( 1) | 20( 3) |

(con.)

# APPENDIX F (Con.)

| | POTR/ AMAL/ TALL FORB | POTR/ AMAL/ THFE | POTR- ABLA/ SHCA | POTR- ABLA/ AMAL | POTR- ABLA/ SYOR/ TALL FORB | POTR- ABLA/ SYOR/ THFE | POTR- ABLA/ SYOR/ BRCA | POTR- ABLA/ JUCO | POTR- ABLA/ TALL FORB | POTR- ABLA/ THFE | POTR- ABLA/ CAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 39 | 20 | 11 | 11 | 20 | 15 | 10 | 19 | 51 | 35 | 13 |
| TREES | | | | | | | | | | | |
| ABIES CONCOLOR | 3( T) | -( -) | -( -) | 9(10) | 5( 5) | -( -) | -( -) | -( -) | 4( 6) | 3(25) | -( -) |
| ABIES LASIOCARPA | -( -) | 5( 5) | 100(17) | 91(17) | 100(22) | 100(23) | 100(19) | 95(28) | 100(21) | 97(26) | 92(38) |
| PICEA ENGELMANNII | -( -) | -( -) | 18(18) | 18(11) | 15(10) | 20(17) | 10( 6) | 32(18) | 24( 9) | 37( 3) | 46( 4) |
| PICEA PUNGENS | -( -) | -( -) | -( -) | -( -) | -( -) | 7( 5) | 10(10) | 16(10) | -( -) | 6( 2) | -( -) |
| PINUS CONTORTA | -( -) | 10( 5) | 27(14) | 9( 8) | -( -) | 20(13) | 10( T) | 16( 9) | 10( 9) | 20( 7) | 15( 6) |
| PINUS FLEXILIS | -( -) | -( -) | 36( 2) | -( -) | -( -) | 13( T) | -( -) | 42( 4) | 4( T) | 17( 1) | -( -) |
| PINUS PONDEROSA | -( -) | 5( 5) | -( -) | -( -) | -( -) | -( -) | -( -) | 5( 4) | -( -) | 3( T) | -( -) |
| POPULUS TREMULOIDES | 100(70) | 100(75) | 100(68) | 100(69) | 100(58) | 100(65) | 100(64) | 100(58) | 100(66) | 100(64) | 100(71) |
| POPULUS TREMULOIDES (reprod.) | 90( 5) | 95( 6) | 9( T) | 55( 5) | 75( 4) | 67( 3) | 40( 3) | 74( 2) | 57( 6) | 69( 3) | 62( 4) |
| PSEUDOTSUGA MENZIESII | 5( T) | 20( 1) | 18( 4) | 27( 9) | 25( 3) | 47( 9) | 40( 1) | 21( 6) | 6( 5) | 20( 4) | 46( 9) |
| SHRUBS | | | | | | | | | | | |
| ACER GLABRUM | -( -) | 10( 2) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 8( T) |
| ACER GRANDIDENTATUM | 18(27) | 25(19) | -( -) | 36( 6) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) |
| AMELANCHIER ALNIFOLIA | 74(13) | 85(18) | 36( 6) | 100( 7) | 20( 6) | 47( 1) | 20( 1) | -( -) | 6( 2) | 20( 1) | 38( T) |
| ARCTOSTAPHYLOS PATULA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 5(40) | -( -) | -( -) | -( -) |
| ARCTOSTAPHYLOS UVA-URSI | -( -) | 5( 5) | -( -) | -( -) | -( -) | -( -) | -( -) | 5( T) | -( -) | 3( T) | -( -) |
| ARTEMISIA TRIDENTATA | -( -) | 5( T) | -( -) | 9( 1) | 15( 4) | -( -) | -( -) | -( -) | 2( T) | -( -) | -( -) |
| BERBERIS REPENS | 36( 2) | 75(11) | 73( 6) | 82( 4) | 25( 2) | 60( 5) | 50( 1) | 47( 2) | 14( 1) | 31( 3) | 54( 8) |
| CEANOTHUS VELUTINUS | 3(25) | -( -) | -( -) | 9( T) | 5( T) | 13( 4) | -( -) | -( -) | -( -) | 6( 1) | -( -) |
| CERCOCARPUS LEDIFOLIUS | -( -) | -( -) | -( -) | -( -) | -( -) | 7( 5) | -( -) | -( -) | -( -) | -( -) | -( -) |
| CHRYSOTHAMNUS VISCIDIFLORUS | -( -) | -( -) | -( -) | 9( 1) | -( -) | -( -) | -( -) | 21( 1) | -( -) | -( -) | -( -) |
| JUNIPERUS COMMUNIS | -( -) | -( -) | 18( 2) | -( -) | 5( 1) | 13( 2) | 20( 2) | 100(10) | 2( T) | 11( 1) | 31( 2) |
| LONICERA INVOLUCRATA | -( -) | 5( 3) | 27( 2) | -( -) | 5( 3) | 7( T) | -( -) | -( -) | 2( T) | -( -) | 8( T) |
| PACHISTIMA MYRSINITES | 3( T) | 25( 1) | 82(16) | 55( 7) | 25( 8) | 40( 5) | 10( 3) | -( -) | 6( T) | 40( 1) | 31( 1) |
| PHYSOCARPUS MALVACEUS | 3( T) | 10( 9) | -( -) | 18(47) | 15(27) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| PRUNUS VIRGINIANA | 79(35) | 75(22) | 9( 1) | 55(23) | 10( 1) | 7( 7) | -( -) | 5( T) | -( -) | 11( T) | 8( T) |
| QUERCUS GAMBELII | 3( T) | -( -) | -( -) | 9(20) | -( -) | -( -) | 10( 3) | -( -) | -( -) | -( -) | -( -) |
| RIBES CEREUM | 28( 3) | 5(15) | -( -) | -( -) | -( -) | 13( 1) | -( -) | -( -) | 4( 3) | 3( T) | -( -) |
| RIBES INERME | 10( 1) | -( -) | -( -) | -( -) | 5( T) | -( -) | -( -) | -( -) | 2( 2) | 3( T) | -( -) |
| RIBES LACUSTRE | -( -) | 5(75) | 9( 1) | 9( 3) | -( -) | 7( T) | -( -) | -( -) | 2( 5) | -( -) | -( -) |
| RIBES MONTIGENUM | 3( 1) | -( -) | -( -) | -( -) | 10( T) | -( -) | -( -) | -( -) | 22( 2) | 3( 2) | -( -) |
| RIBES VISCOSISSIMUM | 3( T) | 5( T) | 18( T) | -( -) | 5( T) | -( -) | -( -) | -( -) | 4( 2) | -( -) | -( -) |
| ROSA WOODSII + | 31( 1) | 50( 1) | 64( 5) | 73( 6) | 40( 1) | 60( T) | 60( 2) | 47( 1) | 8( T) | 31( 1) | 54( 1) |
| RUBUS PARVIFLORUS | 5( T) | 5( T) | 9( 5) | -( -) | -( -) | 13( T) | 10(15) | -( -) | 4( 5) | 9( 1) | 8( T) |
| SALIX SCOULERIANA | 13( 5) | 15( 3) | 9( T) | 18( T) | 5( 3) | 13( 3) | -( -) | -( -) | 8( T) | -( -) | 8( 5) |
| SAMBUCUS RACEMOSA + | 18( 4) | 5( T) | 9( T) | 9( T) | 20( 1) | 7( T) | -( -) | -( -) | 27( 2) | 9( 1) | -( -) |
| SHEPHERDIA CANADENSIS | -( -) | -( -) | 100(23) | 18( 3) | 5( 4) | 7( T) | 10( 3) | 5( T) | 8( 1) | 14( 2) | 8( 3) |
| SORBUS SCOPULINA | 5(22) | -( -) | 27( 1) | 27( 7) | 20( 2) | 13( 2) | 10( T) | -( -) | -( -) | 6( T) | -( -) |
| SPIRAEA BETULIFOLIA | 3( 5) | -( -) | 9( 2) | 9(10) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) |
| SYMPHORICARPOS ALBUS | 3( 5) | 10( 4) | -( -) | 9( 3) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 8( 4) |
| SYMPHORICARPOS OREOPHILUS | 74( 3) | 65( 2) | 82( 3) | 82(27) | 100(29) | 93(21) | 90(31) | 42( 7) | 53( 2) | 60( 1) | 54( 1) |
| VACCINIUM CAESPITOSUM | -( -) | -( -) | 9(70) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| GRAMINOIDS | | | | | | | | | | | |
| AGROPYRON TRACHYCAULUM + | 33( 2) | 35( 2) | 18( T) | 36( 6) | 60( 6) | 27(12) | 100( 7) | 32( 3) | 37( 6) | 57( 3) | 23( 1) |
| BROMUS ANOMALUS | -( -) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | 47( 5) | -( -) | 3( 5) | -( -) |
| BROMUS CARINATUS + | 72( 5) | 40( 5) | 9( 1) | 36( 1) | 65( 9) | 33( 3) | 60( 8) | 5( 5) | 51( 5) | 31( 2) | 15( 3) |
| BROMUS CILIATUS | 3( 7) | 5( 3) | 27( 2) | 18( T) | 5( T) | 7( T) | 20( 3) | 26( 1) | 8( 5) | 11( 1) | 23( 7) |
| CALAMAGROSTIS RUBESCENS | 13(26) | 30(11) | 27( 3) | 9(25) | -( -) | 27(15) | -( -) | -( -) | 2( T) | 3( 3) | 31(37) |
| CAREX GEYERI | 5( 2) | 10( 3) | 9( 5) | 18(18) | 25( 8) | 40( 8) | 40(15) | 11(29) | 2(10) | 20( 2) | 92(14) |
| CAREX HOODII | 21( 2) | 15( 1) | 9( T) | 9( T) | 50( 1) | 7( T) | 10( T) | -( -) | 25( 2) | 20( 2) | -( -) |
| CAREX ROSSII | -( -) | -( -) | 27( T) | 9( T) | 5( T) | 33( 2) | 10( T) | 63( 5) | 12( 1) | 40( 2) | -( -) |
| DACTYLIS GLOMERATA | -( -) | -( -) | -( -) | -( -) | 5( T) | 7( T) | 10( 5) | -( -) | 6( T) | 6( T) | -( -) |
| ELYMUS CINEREUS | 5( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ELYMUS GLAUCUS | 69(15) | 60(16) | 64( 1) | 91( 4) | 45( 6) | 47( 3) | 20(24) | 11( 3) | 49( 9) | 26( 4) | 23(23) |
| FESTUCA IDAHOENSIS + | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 10( 2) | -( -) | -( -) | 9( 1) | -( -) |
| FESTUCA THURBERI | -( -) | -( -) | -( -) | 9(17) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| KOELERIA CRISTATA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 10( T) | -( -) | -( -) | -( -) | -( -) |
| LEUCOPOA KINGII | -( -) | -( -) | -( -) | -( -) | 5( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| MELICA SPECTABILIS | 18( 1) | 15( 1) | 9( 1) | 18( T) | 5( T) | 13( 2) | -( -) | -( -) | 29( 4) | 17( 1) | -( -) |
| PHLEUM ALPINUM | 3( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 8( 1) | -( -) | 8( T) |
| PHLEUM PRATENSE | -( -) | -( -) | -( -) | 9( T) | -( -) | 13( T) | -( -) | -( -) | 8( T) | -( -) | -( -) |
| POA AMPLA | -( -) | -( -) | 18( T) | -( -) | -( -) | 7( T) | -( -) | -( -) | 2( T) | -( -) | -( -) |
| POA FENDLERIANA | -( -) | -( -) | -( -) | -( -) | 5( T) | -( -) | -( -) | 21( 2) | -( -) | 3( 2) | -( -) |
| POA NERVOSA | 13( 3) | 5( T) | 27( 1) | 9( T) | 25( 1) | 13( 4) | 20( 3) | 5(10) | 33( 4) | 26( 7) | 8( 3) |
| POA PALUSTRIS | 5( T) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | -( -) | 4( 1) | -( -) | 8( T) |
| POA PRATENSIS | 41(13) | 50( 9) | -( -) | 27( 3) | 25(28) | 27( 4) | 40(25) | 26( 5) | 18( 7) | 17( 9) | 8( T) |
| SITANION HYSTRIX | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 21( 2) | -( -) | -( -) | -( -) |
| STIPA OCCIDENTALIS + | 3( T) | 10(10) | -( -) | 18( 5) | 5( T) | 20( T) | 60( 7) | 58( 3) | 10( 5) | 26( 7) | 15( T) |
| TRISETUM SPICATUM | -( -) | -( -) | 36( 1) | -( -) | 10( T) | 7( 1) | 10( T) | 16( 6) | 8( T) | 34( T) | 15( T) |

(con.)

# APPENDIX F (Con.)

| | POTR/ AMAL/ TALL FORB | POTR/ AMAL/ THFE | POTR- ABLA/ SHCA | POTR- ABLA/ AMAL | POTR- ABLA/ SYOR/ TALL FORB | POTR- ABLA/ SYOR/ THFE | POTR- ABLA/ SYOR/ BRCA | POTR- ABLA/ JUCO | POTR- ABLA/ TALL FORB | POTR- ABLA/ THFE | POTR- ABLA/ CAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 39 | 20 | 11 | 11 | 20 | 15 | 10 | 19 | 51 | 35 | 13 |
| FORBS | | | | | | | | | | | |
| ACHILLEA MILLEFOLIUM | 28( 1) | 45( 1) | 45( T) | 55( 1) | 45( 1) | 73( 1) | 80( 3) | 58( 2) | 59( 2) | 71( 1) | 69( 2) |
| ACTAEA RUBRA | 5( 6) | 10( 2) | -( -) | -( -) | -( -) | 7( T) | -( -) | -( -) | 6(26) | 3( T) | 8( T) |
| AGASTACHE URTICIFOLIA | 79( 6) | 25( 1) | -( -) | 36( 4) | 45( 6) | 20( 1) | 30( 1) | -( -) | 29( 2) | 9( T) | 8( T) |
| AGOSERIS AURANTIACA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 10( T) | -( -) | -( -) | 3( T) | -( -) |
| AGOSERIS GLAUCA | 3( T) | 10( T) | -( -) | -( -) | -( -) | 13( T) | -( -) | -( -) | -( -) | 11( T) | 15( T) |
| ALLIUM BREVISTYLUM | 3( T) | -( -) | -( -) | 9( T) | 5( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ANGELICA PINNATA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 4( 1) | -( -) | -( -) |
| ANTENNARIA MICROPHYLLA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 11( T) | -( -) | 6( T) | 8( T) |
| APOCYNUM ANDROSAEMIFOLIUM | 8( 4) | 15( 3) | -( -) | 9( 3) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 8( T) |
| AQUILEGIA COERULEA | 5( 2) | -( -) | 27( 2) | 18( T) | 35( 1) | 13( T) | 20( T) | 11( 2) | 33( T) | 17( 1) | 15( T) |
| AQUILEGIA FORMOSA | 36( 4) | -( -) | -( -) | -( -) | -( -) | 7( 3) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ARNICA CORDIFOLIA | 18( 4) | 25(12) | 82( 5) | 9( 1) | 5( 3) | 33( 5) | -( -) | 5( T) | 18(12) | 31(10) | 23( 1) |
| ARNICA LATIFOLIA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 10(20) | 5(30) | 2(10) | 6( 5) | -( -) |
| ARTEMISIA LUDOVICIANA | 5( 1) | -( -) | -( -) | -( -) | 5( T) | -( -) | -( -) | -( -) | 4( 2) | -( -) | -( -) |
| ASTER CHILENSIS | -( -) | 5( T) | -( -) | 9( T) | -( -) | -( -) | 30( 1) | -( -) | -( -) | -( -) | 8( T) |
| ASTER ENGELMANNII | 26( 4) | 30( 1) | 55(10) | 64( 2) | 65( 7) | 27( 1) | 30( 1) | -( -) | 43( 2) | 34( T) | 15( T) |
| ASTER FOLIACEUS | 5( 2) | -( -) | 9( 2) | -( -) | -( -) | 7( 2) | -( -) | -( -) | 6( 2) | -( -) | 8( T) |
| ASTER PERELEGANS | 3( T) | -( -) | -( -) | 9( 2) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | 15( T) |
| ASTRAGALUS MISER | 3( T) | -( -) | 36( 8) | -( -) | -( -) | 7( 2) | 20( 8) | 37( 4) | 4( 1) | 14( 3) | 31(16) |
| BALSAMORHIZA MACROPHYLLA | -( -) | -( -) | -( -) | -( -) | -( -) | 7( 3) | 10( T) | -( -) | 6(21) | 3( T) | -( -) |
| BALSAMORHIZA SAGITTATA | -( -) | 5( T) | 18( T) | -( -) | 5(10) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) |
| CALOCHORTUS NUTTALLII | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 10( T) | 16( T) | -( -) | -( -) | -( -) |
| CAMPANULA ROTUNDIFOLIA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 8( T) |
| CASTILLEJA LINARIAEFOLIA | -( -) | 10( T) | -( -) | -( -) | -( -) | 7( 2) | -( -) | -( -) | -( -) | -( -) | 8( T) |
| CASTILLEJA MINIATA | 13( 1) | 5( T) | 9( T) | 9( T) | 15( 2) | -( -) | 40( T) | 26( T) | 12( 1) | 14( T) | 8( 3) |
| CIRSIUM ARVENSE | 5( T) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | 11( 3) | 4( 1) | 6( T) | -( -) |
| CIRSIUM VULGARE | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 8( T) |
| CLAYTONIA LANCEOLATA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 6(22) | 6( 1) | -( -) |
| CORALLORHIZA MACULATA | 23( T) | 30( 1) | 9( T) | -( -) | 5( T) | 13( T) | -( -) | 5( T) | -( -) | 17( T) | 8( T) |
| DELPHINIUM NUTTALLIANUM | 3( T) | -( -) | 9( T) | 9( T) | 10( 1) | 13( T) | 10( 1) | -( -) | 16( 1) | 11( T) | -( -) |
| DELPHINIUM OCCIDENTALE + | 15( 6) | 10( T) | 9( T) | 9( 2) | 15( 7) | -( -) | -( -) | -( -) | 37( 4) | 9( T) | 8( T) |
| DISPORUM TRACHYCARPUM | 8( 1) | 20( 1) | -( -) | 27( T) | -( -) | 7( T) | -( -) | -( -) | 4( T) | 3( T) | 8( T) |
| EPILOBIUM ANGUSTIFOLIUM | 8( T) | 40( 2) | 82( 1) | 9( 1) | 15( T) | 20( 1) | 20( T) | -( -) | 6( 1) | 20( T) | 23( 1) |
| EQUISETUM ARVENSE | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 4( 1) | -( -) | -( -) |
| ERIGERON PEREGRINUS | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 5( T) | 4( 2) | -( -) | 8( 5) |
| ERIGERON SPECIOSUS | 3( T) | 10( T) | -( -) | 9( 5) | 25( 2) | 13( 2) | 50( 1) | 5( T) | 14( 4) | 11( 2) | 8( T) |
| FRAGARIA VESCA + | 3( 1) | 20( 1) | 73( 1) | 36( 2) | 40( 2) | 47( 2) | 20( 2) | 47( 1) | 25( 2) | 37( 2) | 38( T) |
| FRASERA SPECIOSA | 5( T) | -( -) | 73( 1) | 36( 2) | 20( T) | 33( 1) | 30( 2) | 16( 1) | 8( 3) | 20( T) | 31( 1) |
| FRITILLARIA ATROPURPUREA | 3( T) | -( -) | -( -) | -( -) | 5( T) | 7( T) | -( -) | -( -) | -( -) | -( -) | -( -) |
| GALIUM BOREALE | 26( 5) | 20( 1) | 55( 1) | 36( 1) | 5( T) | 13( T) | 20( 1) | 5( 1) | 20( 1) | 17( T) | 31( 1) |
| GERANIUM RICHARDSONII | -( -) | 5( T) | 9( 2) | 9( 2) | 10(15) | 13( 5) | -( -) | 5( T) | 24(11) | -( -) | 8( T) |
| GERANIUM VISCOSISSIMUM + | 31( 4) | 40( 9) | 100(10) | 55( 2) | 45( 1) | 67(10) | 50( 1) | 21( 2) | 39(10) | 49( 5) | 38( 6) |
| HABENARIA UNALASCENSIS | 5( T) | 5( T) | 9( T) | -( -) | 10( T) | 20( T) | -( -) | 5( T) | -( -) | 9( T) | -( -) |
| HACKELIA FLORIBUNDA | 62( 3) | 20( 1) | 18( T) | 55( 1) | 40( 3) | 13( 1) | 40( T) | 11( T) | 39( 3) | 23( T) | 8( T) |
| HACKELIA PATENS | -( -) | -( -) | -( -) | -( -) | 5( 1) | -( -) | -( -) | -( -) | 2( T) | -( -) | -( -) |
| HEDYSARUM BOREALE | -( -) | -( -) | 45( 2) | -( -) | 5( T) | -( -) | -( -) | -( -) | 4(15) | 6( 2) | 15( 2) |
| HELENIUM HOOPESII | -( -) | -( -) | -( -) | -( -) | 5( T) | 13( T) | 10( 1) | 11( T) | 4( 1) | 3( T) | 8( 3) |
| HELIANTHELLA UNIFLORA | 3( T) | 10( T) | 27( 1) | -( -) | 5(10) | -( -) | -( -) | -( -) | 10( 4) | 3( 1) | 15( T) |
| HERACLEUM LANATUM | 10( 8) | 10( T) | -( -) | 9( T) | 10( 2) | -( -) | -( -) | -( -) | 16(13) | -( -) | -( -) |
| HIERACIUM ALBIFLORUM | -( -) | -( -) | -( -) | 27( 1) | -( -) | 7( T) | 10( 3) | -( -) | 2( T) | 9( T) | 15( T) |
| HIERACIUM CYNOGLOSSOIDES | -( -) | 10( T) | -( -) | -( -) | -( -) | -( -) | 10( T) | -( -) | -( -) | 3( T) | 8( T) |
| HYDROPHYLLUM CAPITATUM | 18( T) | 30( 1) | 9( T) | 9( T) | 35( T) | 13( T) | 10( 1) | -( -) | 27( 1) | 26( 1) | -( -) |
| LATHYRUS LANSZWERTII | 10(10) | 15(20) | -( -) | 18(12) | 20(11) | 20( 4) | 70(33) | 16(22) | 25(10) | 34(31) | 15(21) |
| LATHYRUS LEUCANTHUS | 13( 7) | -( -) | -( -) | 27(39) | 10(12) | 27(22) | 10( T) | -( -) | 14(14) | 11(29) | 38(16) |
| LATHYRUS PAUCIFLORUS | 5( 5) | -( -) | -( -) | 9( T) | 25( 1) | -( -) | -( -) | -( -) | 4( T) | 6( T) | -( -) |
| LIGUSTICUM FILICINUM | 3( 8) | 5(25) | 45( 4) | -( -) | -( -) | -( -) | -( -) | -( -) | 24(18) | 11( T) | 8(15) |
| LUPINUS ARGENTEUS | 15( 3) | 30( 6) | 73( 3) | 9( 7) | 25( 2) | 40( 8) | 10( 3) | 21( 5) | 18( 1) | 31( 7) | 38( 5) |
| LUPINUS CAUDATUS | -( -) | -( -) | -( -) | 18( 4) | 5( 1) | -( -) | 10( 1) | -( -) | -( -) | -( -) | -( -) |
| LUPINUS LAXIFLORUS | 5( T) | 5( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 2(10) | 6(10) | -( -) |
| MERTENSIA ARIZONICA + | 13(13) | -( -) | -( -) | 9( 3) | 40( 6) | 20( 2) | 20( T) | 11( 2) | 27( 9) | 6( T) | -( -) |
| MERTENSIA LONGIFLORA | 3( T) | 5( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 4(21) | -( -) | -( -) |
| OSMORHIZA CHILENSIS + | 64( 7) | 90(14) | 82( 2) | 64( 2) | 45( 2) | 67( 2) | 40( 2) | 16( 1) | 71( 5) | 69( 5) | 54( 2) |
| OSMORHIZA OCCIDENTALIS | 44(11) | 15( 1) | 18( 1) | 18( 5) | 30( 3) | 7( T) | 10( T) | -( -) | 35( 8) | 14( T) | -( -) |
| PAEONIA BROWNII | 13( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| PENSTEMON WATSONI | 3( T) | 5( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 5( 1) | -( -) | -( -) | -( -) |

(con.)

# APPENDIX F (Con.)

| | POTR/ AMAL/ TALL FORB | POTR/ AMAL/ THFE | POTR- ABLA/ SHCA | POTR- ABLA/ AMAL | POTR- ABLA/ SYOR/ TALL FORB | POTR- ABLA/ SYOR/ THFE | POTR- ABLA/ SYOR/ BRCA | POTR- ABLA/ JUCO | POTR- ABLA/ TALL FORB | POTR- ABLA/ THFE | POTR- ABLA/ CAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 39 | 20 | 11 | 11 | 20 | 15 | 10 | 19 | 51 | 35 | 13 |
| PERIDERIDIA GAIRDNERI | 8( T) | 20( T) | 18( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 4( 3) | -( -) | -( -) |
| PHACELIA HETEROPHYLLA | 8( T) | 10( T) | -( -) | -( -) | 25( T) | -( -) | 20( 1) | -( -) | 12( 1) | 3( T) | -( -) |
| POLEMONIUM FOLIOSISSIMUM + | 15( 1) | -( -) | -( -) | 9( T) | 25( 4) | -( -) | 10( T) | -( -) | 18( 1) | 6( 2) | -( -) |
| POTENTILLA DIVERSIFOLIA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 16( 2) | -( -) | -( -) | -( -) |
| POTENTILLA GLANDULOSA | 13( T) | 10( T) | 27( T) | -( -) | 15( T) | 27( 2) | 10( 2) | -( -) | 27( 1) | 29( 1) | 8( T) |
| POTENTILLA GRACILIS | 8( T) | -( -) | 27( 1) | -( -) | 10( 3) | -( -) | -( -) | 16( T) | 6( T) | 23( 1) | 15( T) |
| RANUNCULUS INAMOENUS | 3( T) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | 5( T) | 8( T) | 6( T) | -( -) |
| RUDBECKIA OCCIDENTALIS | 18( 4) | 15( 4) | -( -) | 36( 1) | 55( 9) | 20( 1) | 30( 1) | -( -) | 71(13) | 26( 1) | 8( T) |
| SCROPHULARIA LANCEOLATA | 13( T) | 5( T) | -( -) | -( -) | 20( 3) | -( -) | -( -) | -( -) | 10( T) | -( -) | -( -) |
| SENECIO CRASSULUS | -( -) | -( -) | 18( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 16( 1) | 6( 4) | -( -) |
| SENECIO CYMBALARIOIDES | 3( T) | 10( 3) | -( -) | -( -) | 25( 1) | -( -) | 10( T) | -( -) | 8( 1) | 11( 1) | 8( T) |
| SENECIO INTEGERRIMUS | 5( 3) | 10( 2) | -( -) | -( -) | -( -) | 7( T) | 10( T) | -( -) | -( -) | 6( T) | -( -) |
| SENECIO SERRA + | 67( 7) | 35( 1) | -( -) | 64( 4) | 50( 6) | -( -) | 40( 1) | -( -) | 35( 3) | 14( 1) | -( -) |
| SENECIO STREPTANTHIFOLIUS | -( -) | -( -) | 9( T) | 18( 2) | 5( T) | -( -) | 10( T) | -( -) | -( -) | -( -) | -( -) |
| SIDALCEA OREGANA | 3( T) | 5( T) | -( -) | -( -) | 5( 3) | 13( T) | -( -) | -( -) | -( -) | -( -) | -( -) |
| SILENE MENZIESII | 3( 3) | 5( 2) | 9( T) | 18( 1) | 30( T) | 7( T) | 10( T) | -( -) | 8( T) | 14( 2) | 23( T) |
| SMILACINA RACEMOSA | 46( 5) | 35( 5) | -( -) | 27( T) | -( -) | 20( T) | -( -) | -( -) | 6( T) | 11( T) | 8( T) |
| SMILACINA STELLATA | 31( 3) | 60( 6) | 9( T) | 36( T) | 25( 1) | 20( 4) | 30( 1) | -( -) | 10( 3) | 14( 1) | 38( 2) |
| STELLARIA JAMESIANA | 64( 2) | 45( 2) | 9( T) | 45( 1) | 45( 2) | 47( 1) | 30( 2) | 5( 5) | 55( 2) | 51( 3) | 23( T) |
| TARAXACUM OFFICINALE | 31( 2) | 45( 1) | 18(10) | 36( T) | 45( T) | 40( 1) | 50( 2) | 53( 6) | 59( 2) | 46( 3) | 54( 2) |
| THALICTRUM FENDLERI + | 72(18) | 75(12) | 91(13) | 91( 6) | 85(11) | 93(11) | 70( 1) | 47( 5) | 69( 8) | 74( 6) | 77( 6) |
| THERMOPSIS MONTANA | -( -) | 5(10) | -( -) | -( -) | 5( 2) | 7( T) | -( -) | -( -) | -( -) | -( -) | 8(13) |
| TRAGOPOGON DUBIUS | 3( T) | 10( T) | -( -) | -( -) | -( -) | -( -) | 10( T) | -( -) | 2( T) | 6( T) | -( -) |
| TRIFOLIUM GYMNOCARPON | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 5(20) | -( -) | -( -) | -( -) |
| TRIFOLIUM LONGIPES | -( -) | -( -) | 9( 2) | -( -) | -( -) | -( -) | 10( 5) | 21( 4) | 22(28) | 9( 9) | -( -) |
| URTICA DIOICA | 5( 3) | 5( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 2( 3) | -( -) | -( -) |
| VALERIANA OCCIDENTALIS | 44( 4) | 20( 2) | 18( 2) | 27( 3) | 65( 7) | 40( 1) | 10( T) | -( -) | 61( 6) | 14( 1) | 8( T) |
| VERBASCUM THAPSUS | 3( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 2( T) | -( -) | -( -) |
| VICIA AMERICANA | 15( 2) | 10( T) | -( -) | -( -) | 40( 4) | 13( 2) | 30( 4) | 21( 9) | 18( 9) | 9( 3) | 31( 4) |
| VIGUIERA MULTIFLORA | 3( T) | -( -) | -( -) | -( -) | 5( T) | -( -) | 20( 2) | 5( T) | -( -) | 3( 4) | -( -) |
| VIOLA ADUNCA | 8( 3) | 20( T) | 64( T) | 36( 1) | 25( 1) | 13( 1) | 10( 1) | 11( 1) | 10( 2) | 20( 1) | 38( 1) |
| VIOLA NUTTALLII | 18( 2) | 15( 5) | 9( T) | 9( T) | 10( 1) | 27( 1) | 10( T) | -( -) | 29( 3) | 34( 1) | -( -) |
| VIOLA PURPUREA | -( -) | 5( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) |
| WYETHIA AMPLEXICAULIS | 5( 1) | -( -) | 27( 1) | -( -) | -( -) | 13( 1) | -( -) | -( -) | 6( 2) | 3( T) | 8( T) |
| ANNUALS | | | | | | | | | | | |
| ANDROSACE SEPTENTRIONALIS | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 5( T) | 18( 1) | -( -) | -( -) |
| CHENOPODIUM FREMONTII | 10( T) | 5( T) | -( -) | 9( T) | 15( T) | -( -) | -( -) | -( -) | 8( 2) | -( -) | -( -) |
| COLLINSIA PARVIFLORA | 3( 3) | 5( 2) | 9( T) | 9( T) | 10( 2) | 13( 3) | 20( 9) | -( -) | 8(11) | 14( 2) | -( -) |
| COLLOMIA LINEARIS | 13( 1) | 5( T) | -( -) | -( -) | 5( T) | -( -) | 20( 2) | -( -) | 24( 2) | 9( 2) | 8( T) |
| DESCURAINIA RICHARDSONII | 31( 1) | -( -) | -( -) | 18( 1) | 25( 1) | -( -) | 30( T) | 5( T) | 33( 1) | 9( T) | 15( T) |
| GALIUM APARINE | 31(13) | 20( 2) | -( -) | -( -) | 10(19) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| GALIUM BIFOLIUM | 36( 7) | 15( 1) | 9( T) | -( -) | 5( 3) | 13( 2) | 20( 2) | -( -) | 14( 8) | 17( 6) | -( -) |
| NEMOPHILA BREVIFLORA | 38(15) | 25( 5) | -( -) | 9(20) | 25(12) | -( -) | 10(60) | -( -) | 39(13) | 9( 9) | -( -) |
| POLYGONUM DOUGLASII | 21( 1) | 10( T) | -( -) | 9( T) | 10( T) | -( -) | 10(10) | -( -) | 12( 8) | 11( T) | 8( T) |

(con.)

# APPENDIX F (Con.)

| | POTR-ABLA/CARO | POTR-PICO/SYOR | POTR-PICO/JUCO | POTR-PICO/THFE | POTR-PICO/CAGE | POTR-PSME/AMAL | POTR-PSME/SYOR | POTR-PSME/JUCO | POTR-PSME/CARU | POTR-ABCO/SYOR | POTR-ABCO/ARPA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 46 | 14 | 23 | 7 | 17 | 18 | 15 | 13 | 7 | 32 | 7 |
| TREES | | | | | | | | | | | |
| ABIES CONCOLOR | 2(15) | -( -) | -( -) | -( -) | -( -) | 11( 1) | 13( 7) | 38(16) | -( -) | 100(26) | 100(30) |
| ABIES LASIOCARPA | 93(26) | 43( 2) | 17( 2) | 71( 3) | 41( 2) | 28( 2) | 27( 3) | 23( 2) | 29( T) | 3( 2) | -( -) |
| PICEA ENGELMANNII | 63(15) | -( -) | -( -) | -( -) | 12( 1) | -( -) | -( -) | 8( 5) | 14( T) | 6( 3) | 14( 1) |
| PICEA PUNGENS | 2( T) | 14( T) | 13( 1) | 14( 3) | 6( 3) | -( -) | -( -) | 15( 8) | -( -) | 3( T) | -( -) |
| PINUS CONTORTA | 2( T) | 100(22) | 100(20) | 100(27) | 100(27) | 17( T) | 13( 6) | 8( 6) | 29( T) | -( -) | -( -) |
| PINUS FLEXILIS | 26( 4) | -( -) | 9( 6) | -( -) | 6( T) | -( -) | 7( T) | 23( 4) | 43( 1) | 9( 2) | 71(10) |
| PINUS PONDEROSA | 4( 1) | -( -) | 4(14) | -( -) | -( -) | -( -) | -( -) | 23(10) | -( -) | 3( T) | -( -) |
| POPULUS TREMULOIDES | 100(58) | 100(55) | 100(54) | 100(47) | 100(57) | 100(60) | 100(63) | 100(62) | 100(65) | 100(60) | 100(50) |
| POPULUS TREMULOIDES (reprod.) | 89( 2) | 64( 8) | 70( 4) | 43( 4) | 82( 6) | 56( 4) | 80( 3) | 69( 1) | 43(14) | 78( 2) | 100( 2) |
| PSEUDOTSUGA MENZIESII | 11( 2) | 21( 6) | 13(10) | 14( 5) | 35(12) | 100(20) | 100(16) | 100(16) | 100(16) | 22( 2) | 57(15) |
| SHRUBS | | | | | | | | | | | |
| ACER GLABRUM | -( -) | 7( 1) | -( -) | -( -) | -( -) | 6( 3) | 13( 8) | -( -) | -( -) | -( -) | -( -) |
| ACER GRANDIDENTATUM | 2( T) | -( -) | -( -) | -( -) | -( -) | 22(35) | 33( 1) | -( -) | -( -) | 6( 2) | -( -) |
| AMELANCHIER ALNIFOLIA | 7( 1) | 64(15) | 17( 1) | 57( 2) | 29( T) | 94(19) | 47( 3) | 38( 1) | 43( 1) | 25( T) | 14( T) |
| ARCTOSTAPHYLOS PATULA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 8( 5) | -( -) | 9( 1) | 100(23) |
| ARCTOSTAPHYLOS UVA-URSI | -( -) | -( -) | 39(10) | 14( 1) | 12( 8) | -( -) | -( -) | 15( T) | -( -) | 3( T) | -( -) |
| ARTEMISIA TRIDENTATA | 2( 1) | -( -) | 17( 7) | 14( T) | 6( T) | -( -) | 7( T) | 23( 1) | -( -) | 6( T) | -( -) |
| BERBERIS REPENS | 30( 2) | 43( 3) | 61( 7) | 57( 3) | 59( 2) | 67(14) | 53( 8) | 77(10) | 57( 2) | 47( 5) | 71( 3) |
| CEANOTHUS VELUTINUS | -( -) | 7( 2) | -( -) | 14( 1) | 12( 5) | 6( T) | -( -) | -( -) | -( -) | -( -) | -( -) |
| CERCOCARPUS LEDIFOLIUS | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | 29( 4) |
| CHRYSOTHAMNUS VISCIDIFLORUS | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 7( T) | 8( T) | -( -) | -( -) | -( -) |
| JUNIPERUS COMMUNIS | 28( 1) | 36( 3) | 100(16) | 43( 1) | 47( 2) | -( -) | -( -) | 92(13) | -( -) | 9( 2) | 29( 1) |
| LONICERA INVOLUCRATA | -( -) | 7( T) | -( -) | 29( T) | -( -) | -( -) | -( -) | -( -) | 14( 2) | -( -) | -( -) |
| PACHISTIMA MYRSINITES | -( -) | 36( 8) | 17( 1) | 86( 1) | 29( 1) | 61( 5) | 27( 1) | 8( T) | 14( 1) | 16( 1) | -( -) |
| PHYSOCARPUS MALVACEUS | -( -) | -( -) | -( -) | -( -) | -( -) | 17( 2) | 7( T) | -( -) | -( -) | 3( T) | -( -) |
| PRUNUS VIRGINIANA | -( -) | 21( 7) | 4( T) | 14( 2) | -( -) | 56(24) | 33( 1) | -( -) | -( -) | 3( T) | -( -) |
| QUERCUS GAMBELII | 2(13) | -( -) | -( -) | -( -) | -( -) | 11( 1) | -( -) | -( -) | -( -) | 3( 5) | -( -) |
| RIBES CEREUM | 2( T) | -( -) | -( -) | -( -) | -( -) | 6( T) | 20( 2) | -( -) | -( -) | -( -) | -( -) |
| RIBES LACUSTRE | -( -) | -( -) | -( -) | 14( 2) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| RIBES MONTIGENUM | 7( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) |
| RIBES VISCOSISSIMUM | -( -) | -( -) | -( -) | 14( T) | -( -) | 11( 1) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ROSA WOODSII + | 24( 1) | 71( 7) | 57( T) | 71( 1) | 35( 1) | 78( 2) | 87( 1) | 31( T) | 43( 2) | 56( 1) | -( -) |
| RUBUS PARVIFLORUS | -( -) | 7( T) | -( -) | 14( 1) | 6( T) | 11( 3) | -( -) | 8( T) | -( -) | -( -) | -( -) |
| SALIX SCOULERIANA | -( -) | -( -) | -( -) | 14( 1) | 6( T) | 56( 4) | 13( T) | -( -) | -( -) | -( -) | -( -) |
| SAMBUCUS RACEMOSA + | 2( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 13( T) | -( -) | -( -) | 3( T) | 14( T) |
| SHEPHERDIA CANADENSIS | 2( 1) | 14( 1) | 17(11) | 14( T) | 12( 5) | 6( 4) | 13( 1) | 8( T) | 29( 4) | -( -) | -( -) |
| SORBUS SCOPULINA | -( -) | 7( 1) | -( -) | -( -) | -( -) | 28( 1) | 7( 5) | -( -) | -( -) | -( -) | -( -) |
| SPIRAEA BETULIFOLIA | -( -) | 7( T) | -( -) | -( -) | -( -) | 22(16) | 13(39) | -( -) | -( -) | -( -) | -( -) |
| SYMPHORICARPOS ALBUS | -( -) | 21(12) | -( -) | -( -) | 18( 4) | 28( 6) | 13(25) | -( -) | 14( 5) | -( -) | -( -) |
| SYMPHORICARPOS OREOPHILUS | 33( 1) | 64(24) | 39( 4) | 57( T) | 24( 1) | 67(15) | 87(30) | 77( 8) | 43( 3) | 100(24) | 29( 6) |
| VACCINIUM CAESPITOSUM | -( -) | -( -) | -( -) | 29( 2) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| GRAMINOIDS | | | | | | | | | | | |
| AGROPYRON SPICATUM | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 8( 1) | -( -) | -( -) | -( -) |
| AGROPYRON TRACHYCAULUM + | 39( 2) | 43( 3) | 48( 3) | 57( 2) | 29( 2) | 33( 1) | 47( 4) | 62( 1) | 29( 1) | 56( 2) | -( -) |
| BROMUS ANOMALUS | 30( 6) | -( -) | -( -) | -( -) | -( -) | -( -) | 7( 5) | 31( 2) | -( -) | 19( 6) | 14( 1) |
| BROMUS CARINATUS + | 13( 2) | 7(10) | 13( T) | 29( 1) | 18( 2) | 17(22) | 33(11) | -( -) | 14( T) | 38( 4) | -( -) |
| BROMUS CILIATUS | 7( 2) | 14( 2) | 35( 2) | 14( T) | 18( 2) | -( -) | 7( 1) | 23( 1) | 29( 7) | 13( 4) | 14( T) |
| CALAMAGROSTIS RUBESCENS | 2( T) | 57(31) | -( -) | -( -) | 41(56) | 50(12) | 60(33) | -( -) | 100(41) | -( -) | -( -) |
| CAREX GEYERI | 2( T) | 43(11) | 65( 9) | 43( 3) | 88(21) | 22(22) | 13(52) | 15( 4) | 29(18) | 6( 1) | -( -) |
| CAREX HOODII | 4( T) | 7( T) | -( -) | -( -) | -( -) | -( -) | 20( 5) | -( -) | 14( T) | 3( T) | -( -) |
| CAREX ROSSII | 85( 3) | -( -) | 9( T) | 43( 1) | 6( T) | -( -) | -( -) | 46( 4) | -( -) | 19( 7) | 100( 2) |
| DACTYLIS GLOMERATA | 4( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 13(19) | -( -) | -( -) | 16( 3) | -( -) |
| ELYMUS GLAUCUS | -( -) | 64( 4) | 4( T) | 71(10) | 24( 1) | 83(11) | 67(15) | 8(10) | 71( 3) | 19( 7) | -( -) |
| FESTUCA IDAHOENSIS + | 20( T) | -( -) | 17( 7) | 14( 5) | 6( T) | -( -) | 7( T) | 8( T) | 14( T) | -( -) | -( -) |
| FESTUCA THURBERI | 7( 1) | -( -) | -( -) | -( -) | -( -) | 6( T) | -( -) | -( -) | -( -) | 3( 8) | -( -) |
| HORDEUM JUBATUM | -( -) | -( -) | 4( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| KOELERIA CRISTATA | 11( 1) | -( -) | -( -) | 14( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| LEUCOPOA KINGII | -( -) | -( -) | 4( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| MELICA SPECTABILIS | 9( 1) | 7( T) | 4( T) | 14( T) | 18( 1) | 6( T) | 20( 1) | 8( T) | 14( T) | 13( 1) | -( -) |
| PHLEUM ALPINUM | 7( T) | -( -) | -( -) | 29( 1) | -( -) | -( -) | -( -) | -( -) | 14( 3) | -( -) | -( -) |
| PHLEUM PRATENSE | -( -) | 14( T) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | 29( T) | 3( T) | -( -) |
| POA AMPLA | -( -) | -( -) | 9( T) | 14( 5) | -( -) | -( -) | -( -) | -( -) | 14( 1) | -( -) | -( -) |
| POA FENDLERIANA | 17( 3) | -( -) | 13( 1) | -( -) | 6(10) | -( -) | -( -) | 23( 4) | -( -) | 6( 2) | 57( 1) |
| POA NERVOSA | 11( 2) | 7( 1) | 9( 1) | 29( T) | 24( T) | 6( 1) | 13( T) | 15( 2) | 29( 1) | 16( 4) | 29( 1) |
| POA PALUSTRIS | 2( 2) | 7( T) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) |
| POA PRATENSIS | 17(12) | 43( 8) | 26( 7) | 14( T) | 12( T) | 17( T) | 40( 5) | 38( 6) | 14( 3) | 19( 7) | -( -) |
| SITANION HYSTRIX | 26( 2) | -( -) | 9( T) | -( -) | -( -) | -( -) | 7( 5) | 54( 1) | -( -) | 3( T) | 14( T) |
| STIPA COMATA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 8( T) | -( -) | -( -) | -( -) |
| STIPA OCCIDENTALIS + | 35( 4) | 21( 3) | 65( 6) | 14( 3) | 29( 1) | 11( 5) | 13( 2) | 54( 4) | 14( T) | 34(10) | -( -) |
| TRISETUM SPICATUM | 17( T) | 7( 1) | 35( 1) | 43( 3) | 24( T) | -( -) | 7( T) | 8( T) | 14( T) | 3( T) | -( -) |

(con.)

## APPENDIX F (Con.)

| | POTR- ABLA/ CARO | POTR- PICO/ SYOR | POTR- PICO/ JUCO | POTR- PICO/ THFE | POTR- PICO/ CAGE | POTR- PSME/ AMAL | POTR- PSME/ SYOR | POTR- PSME/ JUCO | POTR- PSME/ CARU | POTR- ABCO/ SYOR | POTR- ABCO/ ARPA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 46 | 14 | 23 | 7 | 17 | 18 | 15 | 13 | 7 | 32 | 7 |
| FORBS | | | | | | | | | | | |
| ACHILLEA MILLEFOLIUM | 74( 2) | 86( 2) | 83( 2) | 86( 1) | 82( 2) | 50( T) | 80( 1) | 31( 1) | 71( 1) | 47( 1) | 14( 2) |
| ACONITUM COLUMBIANUM | -( -) | -( -) | -( -) | 14( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ACTAEA RUBRA | -( -) | -( -) | -( -) | 14( 1) | -( -) | 6( T) | 13( T) | -( -) | 14( T) | -( -) | -( -) |
| AGASTACHE URTICIFOLIA | -( -) | -( -) | 4( 3) | -( -) | -( -) | 11( 2) | 40( 4) | -( -) | -( -) | 22( 4) | -( -) |
| AGOSERIS AURANTIACA | 4( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| AGOSERIS GLAUCA | 7( T) | 14( T) | 4( T) | -( -) | 35( T) | -( -) | -( -) | 8( T) | -( -) | 3( T) | -( -) |
| ALLIUM BREVISTYLUM | -( -) | -( -) | 4( T) | -( -) | 6(13) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ANTENNARIA MICROPHYLLA | 17( T) | 14( T) | 43( 3) | 29( 8) | 35( T) | -( -) | -( -) | 8( T) | -( -) | 9( 2) | -( -) |
| APOCYNUM ANDROSAEMIFOLIUM | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) |
| AQUILEGIA COERULEA | 4( T) | -( -) | 17( T) | 29( 1) | 12( 2) | 6( T) | 7( 1) | 8( T) | -( -) | 16( T) | -( -) |
| ARNICA CORDIFOLIA | 13( 4) | 29( 9) | 9( 3) | 29( 3) | 41( 5) | 44(17) | 33( 7) | 8( 4) | 71(16) | 3( 1) | 14( 4) |
| ARNICA LATIFOLIA | -( -) | 7(10) | 52( 7) | 14(10) | 18(17) | -( -) | -( -) | 15( 8) | -( -) | -( -) | -( -) |
| ARTEMISIA LUDOVICIANA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 8( T) | -( -) | -( -) | -( -) |
| ASTER CHILENSIS | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 13( T) | -( -) | -( -) | -( -) | -( -) |
| ASTER ENGELMANNII | 2( T) | 7( 2) | 4( T) | 14( 2) | 18( 1) | 50( 4) | 40( 2) | -( -) | 14( 5) | 25( 2) | -( -) |
| ASTER FOLIACEUS | 2( T) | 7( 5) | -( -) | -( -) | 12( 2) | -( -) | -( -) | -( -) | 14( 1) | 3( T) | -( -) |
| ASTRAGALUS MISER | 35( 6) | 14(10) | 65(13) | 14( 3) | 29(24) | -( -) | -( -) | 31( 6) | 71( 8) | 3( T) | -( -) |
| BALSAMORHIZA MACROPHYLLA | -( -) | 7(20) | -( -) | -( -) | -( -) | 6( T) | -( -) | -( -) | 14( T) | -( -) | -( -) |
| BALSAMORHIZA SAGITTATA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) |
| CALOCHORTUS NUTTALLII | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 13( T) | 8( T) | -( -) | 3( T) | -( -) |
| CAMPANULA ROTUNDIFOLIA | 2( 2) | 7( 2) | 9( T) | 14( T) | 18( T) | -( -) | -( -) | -( -) | 43( T) | -( -) | -( -) |
| CASTILLEJA LINARIAEFOLIA | -( -) | 29( 1) | 4( T) | -( -) | 18( T) | 6( T) | 7( T) | -( -) | 14( T) | -( -) | -( -) |
| CASTILLEJA MINIATA | 17( T) | 14( 5) | 22( 1) | 14( T) | 29( 1) | 6( T) | 7( T) | -( -) | 14( T) | -( -) | 43( T) |
| CIRSIUM ARVENSE | 9( 4) | -( -) | -( -) | -( -) | -( -) | -( -) | 7( T) | 8( T) | -( -) | 13( T) | -( -) |
| CLAYTONIA LANCEOLATA | 4( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| CORALLORHIZA MACULATA | 4( T) | -( -) | -( -) | -( -) | 12( T) | 11( T) | 7( T) | 8( T) | -( -) | -( -) | 29( T) |
| CREPIS ACUMINATA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) |
| DELPHINIUM NUTTALLIANUM | 4( T) | -( -) | -( -) | -( -) | 12( 2) | 6( T) | 7( T) | -( -) | -( -) | -( -) | -( -) |
| DELPHINIUM OCCIDENTALE + | 2( T) | -( -) | -( -) | -( -) | -( -) | 6( T) | 20( 2) | -( -) | 14( T) | 6( 8) | -( -) |
| DISPORUM TRACHYCARPUM | 2( T) | 7( T) | -( -) | 14( T) | -( -) | 33( T) | -( -) | -( -) | -( -) | -( -) | -( -) |
| EPILOBIUM ANGUSTIFOLIUM | 17( T) | 21(10) | 4( 2) | -( -) | 29( T) | 22( 1) | 20( 4) | -( -) | 57(14) | -( -) | -( -) |
| EQUISETUM ARVENSE | -( -) | -( -) | -( -) | 14( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ERIGERON FLAGELLARIS | 2( T) | -( -) | -( -) | -( -) | 6( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| ERIGERON PEREGRINUS | 2( T) | 14(10) | 30( 4) | 14( T) | 6( 1) | -( -) | -( -) | 8(10) | 14( T) | -( -) | -( -) |
| ERIGERON SPECIOSUS | 2( T) | 29( 3) | 17( 1) | -( -) | 6( T) | 11( T) | 27( 1) | -( -) | 14( T) | 9( T) | -( -) |
| FRAGARIA VESCA + | 48( 1) | 64( 3) | 43( 3) | 86( T) | 41( 5) | 50( 2) | 40( 3) | 15( 8) | 100( 1) | 9( 3) | -( -) |
| FRASERA SPECIOSA | 9( T) | 21( T) | 26( 2) | -( -) | 18( 2) | -( -) | 13( T) | 8( 2) | 14( T) | 31( 1) | -( -) |
| FRITILLARIA ATROPURPUREA | 2( T) | 7( T) | -( -) | -( -) | 6( T) | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) |
| GALIUM BOREALE | -( -) | 36( T) | 52( 1) | 43( 1) | 24( T) | 28( 1) | 20( 4) | 8( T) | 57( 1) | 16( 1) | -( -) |
| GERANIUM RICHARDSONII | 2( T) | 14( 1) | 4( T) | 14(10) | 12( 2) | -( -) | 13(16) | -( -) | -( -) | 3( 2) | -( -) |
| GERANIUM VISCOSISSIMUM + | 4( 3) | 71(15) | 70( 2) | 57( 3) | 47(10) | 61( 4) | 73(12) | 8( T) | 86( 6) | 16( 3) | -( -) |
| HABENARIA UNALASCENSIS | 2( T) | 21( T) | -( -) | 14( T) | 18( T) | 17( T) | 13( T) | -( -) | -( -) | -( -) | -( -) |
| HACKELIA FLORIBUNDA | -( -) | 7( 5) | 4( T) | -( -) | 6( T) | 6( T) | 27( 1) | -( -) | -( -) | 16( 2) | -( -) |
| HEDYSARUM BOREALE | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 14(15) | -( -) | -( -) |
| HELENIUM HOOPESII | 4( 3) | -( -) | -( -) | 14( T) | -( -) | -( -) | 7( T) | -( -) | -( -) | 3( T) | -( -) |
| HELIANTHELLA UNIFLORA | 9( T) | -( -) | 9( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| HERACLEUM LANATUM | -( -) | 7( 1) | -( -) | -( -) | -( -) | -( -) | 7(20) | -( -) | -( -) | -( -) | -( -) |
| HIERACIUM ALBIFLORUM | -( -) | 14( T) | 9( T) | -( -) | 18( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| HIERACIUM CYNOGLOSSOIDES | -( -) | 14( T) | -( -) | -( -) | 18( 1) | 17( T) | 20( T) | -( -) | 14( T) | -( -) | -( -) |
| HYDROPHYLLUM CAPITATUM | -( -) | -( -) | -( -) | -( -) | 6( T) | 17( 1) | -( -) | -( -) | -( -) | -( -) | -( -) |
| LATHYRUS LANSZWERTII | 2( T) | 14( 5) | 22(12) | 29(26) | 18(15) | 11(12) | 13(23) | -( -) | -( -) | 22(21) | -( -) |
| LATHYRUS LEUCANTHUS | 7( 6) | -( -) | -( -) | 14(25) | -( -) | 11(49) | 20(28) | 31(26) | -( -) | 6(28) | -( -) |
| LATHYRUS PAUCIFLORUS | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) | 7( 3) | -( -) | -( -) | 13( 2) | -( -) |
| LIGUSTICUM FILICINUM | 15( T) | 21( 2) | -( -) | 14( T) | 18( 6) | -( -) | 20( 9) | -( -) | -( -) | -( -) | -( -) |
| LUPINUS ARGENTEUS | 30( 8) | 79( 5) | 52( 6) | 29( 3) | 71( 5) | 33( 5) | 53( 4) | 31( 1) | 86( 2) | 16( 1) | -( -) |
| LUPINUS CAUDATUS | -( -) | -( -) | -( -) | 14( T) | -( -) | 6( T) | -( -) | -( -) | -( -) | -( -) | -( -) |
| LUPINUS LAXIFLORUS | 2( 5) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 22( 2) | 29( 4) |
| MERTENSIA ARIZONICA + | 13( 1) | -( -) | -( -) | 14( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 19( 5) | -( -) |
| MERTENSIA LONGIFLORA | -( -) | -( -) | -( -) | -( -) | -( -) | 17( T) | -( -) | -( -) | -( -) | -( -) | -( -) |
| OSMORHIZA CHILENSIS + | 13( 1) | 64( 3) | 22( T) | 100( 2) | 59( 3) | 78( 5) | 87( 4) | 15( T) | 86( 3) | 63( 3) | -( -) |
| OSMORHIZA OCCIDENTALIS | 2( T) | 14( 1) | -( -) | -( -) | -( -) | 11( 9) | 27( T) | -( -) | -( -) | 13( 1) | -( -) |
| PENSTEMON WATSONI | 4( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 22( 1) | 43( 1) |

(con.)

# APPENDIX F (Con.)

| | POTR-ABLA/CARO | POTR-PICO/SYOR | POTR-PICO/JUCO | POTR-PICO/THFE | POTR-PICO/CAGE | POTR-PSME/AMAL | POTR-PSME/SYOR | POTR-PSME/JUCO | POTR-PSME/CARU | POTR-ABCO/SYOR | POTR-ABCO/ARPA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Stands: | 46 | 14 | 23 | 7 | 17 | 18 | 15 | 13 | 7 | 32 | 7 |
| PERIDERIDIA GAIRDNERI | -( -) | 43( 1) | -( -) | -( -) | 18( 2) | 22( T) | 7( T) | -( -) | 43( 1) | -( -) | -( -) |
| PHACELIA HETEROPHYLLA | 2( T) | -( -) | -( -) | -( -) | 6( T) | -( -) | 13( T) | -( -) | -( -) | 3( T) | -( -) |
| POLEMONIUM FOLIOSISSIMUM + | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | -( -) | 6( T) | -( -) |
| POTENTILLA DIVERSIFOLIA | 2( T) | -( -) | -( -) | -( -) | 6( T) | -( -) | -( -) | 15( T) | -( -) | -( -) | -( -) |
| POTENTILLA GLANDULOSA | 2( T) | 57( 1) | 4( T) | 14( 1) | 12( 3) | 17( T) | 20( T) | -( -) | 57( T) | -( -) | -( -) |
| POTENTILLA GRACILIS | 17( 1) | 29( 1) | 30( T) | 29( T) | 24( 2) | -( -) | 13( T) | 15( T) | 29( T) | -( -) | -( -) |
| PTERIDIUM AQUILINUM | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 7(35) | -( -) | -( -) | -( -) | -( -) |
| RANUNCULUS INAMOENUS | 9( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| RUDBECKIA OCCIDENTALIS | -( -) | 14( 1) | -( -) | -( -) | -( -) | 17( 1) | 33( 1) | -( -) | -( -) | 25( 3) | -( -) |
| SCROPHULARIA LANCEOLATA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 9( T) | -( -) |
| SENECIO CRASSULUS | 9( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) |
| SENECIO CYMBALARIOIDES | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) | 13( T) | -( -) | -( -) | 9( T) | -( -) |
| SENECIO INTEGERRIMUS | 9( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| SENECIO SERRA + | -( -) | -( -) | -( -) | 29( T) | -( -) | -( -) | 20( 1) | 8( 2) | 14( T) | 13( 4) | -( -) |
| SENECIO STREPTANTHIFOLIUS | -( -) | -( -) | 4( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| SIDALCEA OREGANA | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) |
| SILENE MENZIESII | -( -) | -( -) | 9( T) | 14( T) | 6( T) | 44( T) | 13( T) | -( -) | -( -) | -( -) | -( -) |
| SMILACINA RACEMOSA | -( -) | -( -) | -( -) | -( -) | 6( T) | 39( 1) | 20( T) | -( -) | 29( T) | -( -) | -( -) |
| SMILACINA STELLATA | 2( T) | 21( 1) | 9( T) | 14( T) | 18( T) | 39( 2) | 33( 1) | 15( T) | -( -) | 3( 1) | -( -) |
| STELLARIA JAMESIANA | 20( 2) | 29( 3) | 9( T) | 43( T) | 24( T) | 11( 1) | 33( 1) | 8( 1) | -( -) | 63( 1) | 57( 1) |
| TARAXACUM OFFICINALE | 65( 1) | 57( 2) | 52( 4) | 43( 4) | 35( 3) | 33( T) | 40( 1) | 38( 8) | 57( 2) | 41( 2) | -( -) |
| THALICTRUM FENDLERI + | 24( 2) | 79( 8) | 48( 8) | 57( 8) | 41(10) | 83(13) | 87(10) | 62( 1) | 86( 8) | 34( 4) | -( -) |
| THERMOPSIS MONTANA | -( -) | -( -) | 9( 4) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) |
| TRAGOPOGON DUBIUS | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) |
| TRIFOLIUM GYMNOCARPON | 7(13) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 19( 2) | 29( 9) |
| TRIFOLIUM LONGIPES | 26(20) | -( -) | 17(11) | 29( 5) | 6( T) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) |
| VALERIANA OCCIDENTALIS | -( -) | 21( 1) | -( -) | -( -) | -( -) | 11( T) | 53( 3) | -( -) | 29( 3) | 22( 4) | -( -) |
| VERATRUM CALIFORNICUM | -( -) | -( -) | -( -) | 14( 4) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) |
| VICIA AMERICANA | 9( 8) | 14( T) | -( -) | -( -) | 6( T) | 6( 2) | 20( 2) | 8(25) | -( -) | 25( 7) | -( -) |
| VIGUIERA MULTIFLORA | 2( T) | 7( T) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) |
| VIOLA ADUNCA | 2( T) | 7( 1) | -( -) | 14( T) | 18( T) | 17( 1) | 13( 4) | -( -) | 14( T) | 13( 1) | -( -) |
| VIOLA NUTTALLII | 2( 1) | 14( 1) | -( -) | -( -) | 12( T) | 6( T) | 7( T) | 8( 1) | -( -) | 6( 1) | -( -) |
| VIOLA PURPUREA | 2( T) | -( -) | -( -) | 29( 1) | -( -) | -( -) | -( -) | -( -) | -( -) | 3( T) | -( -) |
| WYETHIA AMPLEXICAULIS | -( -) | 7( T) | -( -) | -( -) | -( -) | 6( 1) | 7( T) | -( -) | -( -) | 3( 1) | -( -) |
| ANNUALS | | | | | | | | | | | |
| ANDROSACE SEPTENTRIONALIS | 9( T) | -( -) | -( -) | -( -) | -( -) | -( -) | 7( T) | -( -) | -( -) | -( -) | -( -) |
| CHENOPODIUM FREMONTII | 2( T) | -( -) | -( -) | -( -) | 6( T) | -( -) | 7( T) | -( -) | -( -) | 6( T) | -( -) |
| COLLINSIA PARVIFLORA | 4( T) | -( -) | -( -) | 14( T) | 6( T) | 11( T) | 13( 3) | 8( 1) | 14( 3) | -( -) | -( -) |
| COLLOMIA LINEARIS | 2( T) | -( -) | -( -) | -( -) | 6( 5) | -( -) | 7( 2) | -( -) | -( -) | 13( T) | -( -) |
| DESCURAINIA RICHARDSONII | 9( T) | -( -) | -( -) | -( -) | 6( T) | -( -) | 13( T) | 8( T) | -( -) | 16( T) | -( -) |
| GALIUM APARINE | -( -) | -( -) | -( -) | -( -) | -( -) | 6( T) | -( -) | -( -) | -( -) | -( -) | -( -) |
| GALIUM BIFOLIUM | 7( T) | 7( T) | -( -) | 14( T) | 6( T) | 17( 1) | 7( T) | -( -) | -( -) | 9( 5) | -( -) |
| NEMOPHILA BREVIFLORA | -( -) | -( -) | -( -) | -( -) | -( -) | 17( T) | 27( 4) | -( -) | -( -) | 6(13) | -( -) |
| POLYGONUM DOUGLASII | 7( T) | 7( T) | -( -) | -( -) | 6( T) | 6( T) | 13(10) | 8( T) | -( -) | 6( 3) | -( -) |

(con.)

# APPENDIX F (Con.)

| | POTR-ABCO/POPR | POTR-PIPU | POTR-PIFL | POTR-PIPO | ALL STANDS |
|---|---|---|---|---|---|
| Number of Stands: | 12 | 15 | 9 | 18 | 2137 |
| TREES | | | | | |
| ABIES CONCOLOR | 100(26) | 33(12) | 22( 5) | 11( 1) | 8(12) |
| ABIES LASIOCARPA | -( -) | -( -) | -( -) | -( -) | 29(10) |
| PICEA ENGELMANNII | 17( 3) | -( -) | 33( 4) | -( -) | 10( 6) |
| PICEA PUNGENS | -( -) | 100(22) | -( -) | 17( 1) | 3( 7) |
| PINUS CONTORTA | -( -) | -( -) | -( -) | -( -) | 12( 9) |
| PINUS FLEXILIS | 8( T) | 27( 3) | 100(18) | 6( T) | 10( 2) |
| PINUS PONDEROSA | -( -) | 7(10) | -( -) | 100(27) | 3( 9) |
| POPULUS TREMULOIDES | 100(66) | 100(60) | 100(66) | 100(56) | 100(69) |
| POPULUS TREMULOIDES (reprod.) | 92( 4) | 93( 3) | 89( 3) | 83( 5) | 78( 5) |
| PSEUDOTSUGA MENZIESII | 42( 4) | 40( 4) | 22(10) | 22( 2) | 19( 5) |
| SHRUBS | | | | | |
| ACER GLABRUM | -( -) | -( -) | -( -) | -( -) | 1( 2) |
| ACER GRANDIDENTATUM | -( -) | -( -) | -( -) | -( -) | 7(10) |
| AMELANCHIER ALNIFOLIA | -( -) | 20( T) | -( -) | 33( 1) | 34( 7) |
| ARCTOSTAPHYLOS PATULA | -( -) | -( -) | 11(50) | 11( 3) | 1(17) |
| ARCTOSTAPHYLOS UVA-URSI | -( -) | -( -) | -( -) | 11(15) | 3( 7) |
| ARTEMISIA TRIDENTATA | -( -) | 13( 4) | -( -) | 11( 3) | 10( 4) |
| BERBERIS REPENS | 33( 2) | 33(14) | 78( 6) | 61( 2) | 37( 6) |
| CEANOTHUS VELUTINUS | -( -) | -( -) | -( -) | -( -) | 2( 6) |
| CERCOCARPUS LEDIFOLIUS | -( -) | 7( 2) | 11( T) | -( -) | 1( 2) |
| CHRYSOTHAMNUS VISCIDIFLORUS | -( -) | 27( 3) | -( -) | -( -) | 3( 2) |
| JUNIPERUS COMMUNIS | 25( 3) | 87(13) | 56( 9) | 72( 5) | 16(19) |
| LONICERA INVOLUCRATA | -( -) | -( -) | -( -) | -( -) | 1( 1) |
| PACHISTIMA MYRSINITES | -( -) | -( -) | -( -) | 6(10) | 14(10) |
| PHYSOCARPUS MALVACEUS | -( -) | -( -) | -( -) | -( -) | 2(15) |
| PRUNUS VIRGINIANA | 8( 1) | -( -) | 11( T) | 6( T) | 22(13) |
| QUERCUS GAMBELII | -( -) | -( -) | -( -) | 17(33) | 2( 7) |
| RIBES CEREUM | 8( 1) | -( -) | -( -) | 6( T) | 6( 2) |
| RIBES INERME | -( -) | 7( 5) | -( -) | -( -) | 2( 2) |
| RIBES LACUSTRE | -( -) | -( -) | -( -) | -( -) | 1( 7) |
| RIBES MONTIGENUM | -( -) | -( -) | -( -) | 6( T) | 3( 4) |
| RIBES VISCOSISSIMUM | -( -) | -( -) | -( -) | 6( 5) | 1( 1) |
| ROSA WOODSII + | 17( 1) | 20( T) | 22( T) | 39( 2) | 40( 3) |
| RUBUS PARVIFLORUS | -( -) | -( -) | -( -) | -( -) | 2( -) |
| SALIX SCOULERIANA | 8(10) | -( -) | -( -) | -( -) | 4( 5) |
| SAMBUCUS RACEMOSA + | 8( 1) | -( -) | 11( 1) | -( -) | 9( 3) |
| SHEPHERDIA CANADENSIS | -( -) | -( -) | -( -) | -( -) | 7( 6) |
| SORBUS SCOPULINA | -( -) | -( -) | -( -) | -( -) | 3( 3) |
| SPIRAEA BETULIFOLIA | -( -) | -( -) | -( -) | -( -) | 2(22) |
| SYMPHORICARPOS ALBUS | -( -) | -( -) | -( -) | -( -) | 5(17) |
| SYMPHORICARPOS OREOPHILUS | 92( 3) | 60( 5) | 89( 2) | 61(15) | 73(15) |
| VACCINIUM CAESPITOSUM | -( -) | -( -) | -( -) | -( -) | +(15) |
| GRAMINOIDS | | | | | |
| AGROPYRON SPICATUM | -( -) | -( -) | -( -) | -( -) | 1( 1) |
| AGROPYRON TRACHYCAULUM + | 83( 4) | 47( 2) | 67( 6) | 28( 2) | 51( 4) |
| BROMUS ANOMALUS | 8(10) | 53( 4) | 44( 6) | 17( 5) | 7( 7) |
| BROMUS CARINATUS + | 67(12) | 13( T) | 22( T) | 11( T) | 46( 8) |
| BROMUS CILIATUS | 17( 3) | -( -) | 22(21) | 6( 1) | 11( 3) |
| CALAMAGROSTIS RUBESCENS | -( -) | -( -) | -( -) | -( -) | 15(33) |
| CAREX GEYERI | -( -) | 20(11) | -( -) | 11(59) | 15(16) |
| CAREX HOODII | 8( 3) | -( -) | -( -) | -( -) | 16( 3) |
| CAREX ROSSII | 17( 3) | 13( 7) | 78( 8) | 39( 2) | 15( 4) |
| DACTYLIS GLOMERATA | -( -) | -( -) | -( -) | 6(25) | 5( 4) |
| ELYMUS CINEREUS | 17( T) | -( -) | -( -) | -( -) | 3( 4) |
| ELYMUS GLAUCUS | 17( 5) | -( -) | 11( 3) | -( -) | 37(10) |
| FESTUCA IDAHOENSIS + | 8( T) | -( -) | 11( T) | 11( 1) | 8( 2) |
| FESTUCA THURBERI | -( -) | -( -) | -( -) | -( -) | 2( 9) |
| HORDEUM JUBATUM | -( -) | -( -) | -( -) | -( -) | +( T) |
| KOELERIA CRISTATA | -( -) | 13( T) | -( -) | 17( 1) | 2( 2) |
| LEUCOPOA KINGII | -( -) | -( -) | 11( T) | -( -) | 2( 3) |
| MELICA SPECTABILIS | 8( 1) | 7( T) | 11(10) | -( -) | 17( 2) |
| PHLEUM ALPINUM | -( -) | -( -) | 11( T) | -( -) | 4( 5) |
| PHLEUM PRATENSE | -( -) | -( -) | -( -) | -( -) | 4( 2) |
| POA AMPLA | -( -) | -( -) | 11( T) | -( -) | 3( 2) |
| POA FENDLERIANA | -( -) | 13( 3) | 56( 7) | 50( 3) | 6( 3) |
| POA NERVOSA | 25(23) | -( -) | 44( 1) | 6( T) | 17( 4) |
| POA PALUSTRIS | -( -) | -( -) | 11( 3) | -( -) | 2( 6) |
| POA PRATENSIS | 100(22) | 47(11) | -( -) | 44( 5) | 34(15) |
| SITANION HYSTRIX | 8( T) | 27( 2) | 22( 1) | 44( 5) | 6( 2) |
| STIPA COMATA | -( -) | 13(15) | -( -) | 22(10) | 2( 9) |
| STIPA OCCIDENTALIS + | 42( 4) | 67( 6) | 11( T) | 17( T) | 25( 6) |
| TRISETUM SPICATUM | 8( T) | -( -) | 22( 1) | 6( T) | 8( 1) |

(con.)

## APPENDIX F (Con.)

| | POTR-ABCO/POPR | POTR-PIPU | POTR-PIFL | POTR-PIPO | ALL STANDS |
|---|---|---|---|---|---|
| Number of Stands: | 12 | 15 | 9 | 18 | 2137 |
| FORBS | | | | | |
| ACHILLEA MILLEFOLIUM | 75( 2) | 80( 1) | 89( 1) | 50( 2) | 56( 2) |
| ACONITUM COLUMBIANUM | -( -) | -( -) | -( -) | -( -) | 1( 5) |
| ACTAEA RUBRA | 8( T) | -( -) | -( -) | -( -) | 3( 4) |
| AGASTACHE URTICIFOLIA | -( -) | -( -) | -( -) | -( -) | 27( 4) |
| AGOSERIS AURANTIACA | -( -) | -( -) | 11( T) | -( -) | 2( T) |
| AGOSERIS GLAUCA | -( -) | -( -) | 22( T) | 11( T) | 7( T) |
| ALLIUM BREVISTYLUM | -( -) | -( -) | -( -) | 6( T) | 2( 1) |
| ANGELICA PINNATA | -( -) | -( -) | -( -) | -( -) | 1( 1) |
| ANTENNARIA MICROPHYLLA | -( -) | 27( 6) | -( -) | 28( T) | 9( 2) |
| APOCYNUM ANDROSAEMIFOLIUM | -( -) | -( -) | -( -) | -( -) | 2( 2) |
| AQUILEGIA COERULEA | -( -) | 7( T) | -( -) | 6( 3) | 10( 1) |
| AQUILEGIA FORMOSA | 8( 2) | -( -) | -( -) | -( -) | 5( 4) |
| ARNICA CORDIFOLIA | -( -) | -( -) | 33( 7) | -( -) | 12( 8) |
| ARNICA LATIFOLIA | -( -) | -( -) | -( -) | -( -) | 2( 9) |
| ARTEMISIA LUDOVICIANA | -( -) | -( -) | -( -) | -( -) | 2( 3) |
| ASTER CHILENSIS | -( -) | 7( T) | -( -) | -( -) | 2( 1) |
| ASTER ENGELMANNII | -( -) | -( -) | -( -) | -( -) | 18( 3) |
| ASTER FOLIACEUS | -( -) | -( -) | -( -) | -( -) | 6( 3) |
| ASTER PERELEGANS | 8( T) | -( -) | -( -) | -( -) | 3( 1) |
| ASTRAGALUS MISER | 8(10) | 40( 2) | 22( 8) | 17( 4) | 13(10) |
| BALSAMORHIZA MACROPHYLLA | -( -) | -( -) | -( -) | -( -) | 2( 6) |
| BALSAMORHIZA SAGITTATA | -( -) | -( -) | 11( T) | -( -) | 2( 4) |
| CALOCHORTUS NUTTALLII | -( -) | 13( T) | -( -) | 6( T) | 2( T) |
| CAMPANULA ROTUNDIFOLIA | -( -) | 7( T) | -( -) | 6( T) | 4( T) |
| CASTILLEJA LINARIAEFOLIA | -( -) | -( -) | -( -) | -( -) | 3( 1) |
| CASTILLEJA MINIATA | 8( T) | 20( T) | 22( T) | -( -) | 11( 1) |
| CIRSIUM ARVENSE | -( -) | 20( 2) | 11( T) | -( -) | 3( 1) |
| CIRSIUM VULGARE | -( -) | -( -) | -( -) | -( -) | 1( 1) |
| CLAYTONIA LANCEOLATA | -( -) | -( -) | -( -) | -( -) | 1( 4) |
| CORALLORHIZA MACULATA | 8( T) | -( -) | -( -) | 6( T) | 6( T) |
| CREPIS ACUMINATA | 8( T) | 7( T) | -( -) | -( -) | 2( T) |
| DELPHINIUM NUTTALLIANUM | -( -) | -( -) | -( -) | 11( T) | 7( T) |
| DELPHINIUM OCCIDENTALE + | 17( T) | -( -) | 11( T) | -( -) | 12( 3) |
| DISPORUM TRACHYCARPUM | -( -) | -( -0 | -( -) | -( -) | 2( T) |
| EPILOBIUM ANGUSTIFOLIUM | -( -) | 7( T) | 11( T) | -( -) | 12( 3) |
| EQUISETUM ARVENSE | -( -) | -( -) | -( -) | -( -) | +(17) |
| ERIGERON FLAGELLARIS | -( -) | 13( T) | 11( 1) | -( -) | 1( T) |
| ERIGERON PEREGRINUS | -( -) | -( -) | -( -) | -( -) | 2( 2) |
| ERIGERON SPECIOSUS | -( -) | -( -) | -( -) | 22( 1) | 13( 2) |
| FRAGARIA VESCA + | -( -) | 47( 4) | 22( 1) | 39( 1) | 24( 3) |
| FRASERA SPECIOSA | -( -) | -( -) | -( -) | 11( T) | 14( 1) |
| FRITILLARIA ATROPURPUREA | -( -) | -( -) | -( -) | -( -) | 1( T) |
| GALIUM BOREALE | -( -) | 13( 3) | -( -) | 6( T) | 17( 2) |
| GERANIUM RICHARDSONII | 8( T) | 7( 3) | -( -) | -( -) | 5( 6) |
| GERANIUM VISCOSISSIMUM + | 8( 2) | 20( T) | 11(10) | 28( 1) | 45( 7) |
| HABENARIA UNALASCENSIS | -( -) | -( -) | -( -) | -( -) | 5( T) |
| HACKELIA FLORIBUNDA | -( -) | -( -) | 11( 2) | -( -) | 25( 3) |
| HACKELIA PATENS | 8( 4) | -( -) | -( -) | -( -) | 1( 1) |
| HEDYSARUM BOREALE | -( -) | -( -) | -( -) | -( -) | 4( 2) |
| HELENIUM HOOPESII | -( -) | 13( T) | -( -) | -( -) | 4( 2) |
| HELIANTHELLA UNIFLORA | -( -) | -( -) | -( -) | -( -) | 5( 3) |
| HERACLEUM LANATUM | -( -) | -( -) | -( -) | -( -) | 4( 9) |
| HIERACIUM ALBIFLORUM | -( -) | -( -) | -( -) | -( -) | 2( 1) |
| HIERACIUM CYNOGLOSSOIDES | -( -) | 7( T) | -( -) | -( -) | 4( T) |
| HYDROPHYLLUM CAPITATUM | -( -) | -( -) | 11( T) | -( -) | 12( 1) |
| LATHYRUS LANSZWERTII | -( -) | 13(25) | -( -) | 6( 5) | 16(16) |
| LATHYRUS LEUCANTHUS | -( -) | 7( T) | -( -) | 17(13) | 9(19) |
| LATHYRUS PAUCIFLORUS | -( -) | -( -) | -( -) | -( -) | 4( 3) |
| LIGUSTICUM FILICINUM | -( -) | -( -) | 11(20) | -( -) | 6(10) |
| LUPINUS ARGENTEUS | -( -) | 7(10) | 11( 3) | 22( 5) | 30( 7) |
| LUPINUS CAUDATUS | -( -) | -( -) | -( -) | -( -) | 2( 2) |
| LUPINUS LAXIFLORUS | 25( 2) | -( -) | -( -) | -( -) | 4( 4) |
| LUPINUS SERICEUS | -( -) | -( -) | -( -) | -( -) | 3( 5) |
| MERTENSIA ARIZONICA + | 8( 5) | 13(13) | 22( T) | -( -) | 13( 8) |
| MERTENSIAL LONGIFLORA | -( -) | -( -) | -( -) | -( -) | 1( 6) |
| OSMORHIZA CHILENSIS + | 25( 4) | 47( T) | 11( 2) | 6( T) | 44( 5) |
| OSMORHIZA OCCIDENTALIS | 25( 4) | 7( T) | 11( 2) | -( -) | 19( 7) |
| PAEONIA BROWNII | -( -) | -( -) | -( -) | -( -) | 1( 1) |
| PENSTEMON PROCERUS | -( -) | -( -) | -( -) | 6( T) | 1( 1) |
| PENSTEMON WATSONI | 8( T) | -( -) | 67( 1) | -( -) | 5( 1) |

(con.)

## APPENDIX F (Con.)

| Number of Stands: | POTR-ABCO/POPR 12 | POTR-PIPU 15 | POTR-PIFL 9 | POTR-PIPO 18 | ALL STANDS 2137 |
|---|---|---|---|---|---|
| PERIDERIDIA GAIRDNERI | -( -) | -( -) | -( -) | -( -) | 10( 1) |
| PHACELIA HETEROPHYLLA | -( -) | -( -) | 33( T) | -( -) | 7( 1) |
| POLEMONIUM FOLIOSISSIMUM + | -( -) | -( -) | -( -) | -( -) | 9( 2) |
| POTENTILLA DIVERSIFOLIA | -( -) | 33( T) | -( -) | 11( T) | 1( 1) |
| POTENTILLA GLANDULOSA | -( -) | -( -) | -( -) | -( -) | 17( 1) |
| POTENTILLA GRACILIS | 8( T) | -( -) | 11( 1) | 11( 2) | 14( 1) |
| PTERIDIUM AQUILINUM | -( -) | -( -) | -( -) | -( -) | 1(44) |
| RANUNCULUS INAMOENUS | -( -) | -( -) | -( -) | -( -) | 2( 1) |
| RUDBECKIA OCCIDENTALIS | -( -) | -( -) | -( -) | -( -) | 23(10) |
| SCROPHULARIA LANCEOLATA | -( -) | -( -) | -( -) | -( -) | 5( 1) |
| SENECIO CRASSULUS | -( -) | -( -) | 11( T) | 6( T) | 3( 2) |
| SENECIO CYMBALARIOIDES | -( -) | -( -) | -( -) | 6( T) | 7( 1) |
| SENECIO INTEGERRIMUS | -( -) | -( -) | -( -) | -( -) | 4( 1) |
| SENECIO SERRA + | -( -) | -( -) | 11( 1) | -( -) | 24( 4) |
| SENECIO STREPTANTHIFOLIUS | -( -) | -( -) | -( -) | -( -) | 2( T) |
| SIDALCEA OREGANA | -( -) | -( -) | -( -) | -( -) | 2( 1) |
| SILENE MENZIESII | -( -) | -( -) | -( -) | -( -) | 7( 1) |
| SMILACINA RACEMOSA | -( -) | -( -) | -( -) | -( -) | 8( 2) |
| SMILACINA STELLATA | -( -) | 7( T) | -( -) | 6( T) | 18( 3) |
| STELLARIA JAMESIANA | 50( 3) | 7( T) | 67( 4) | 11( T) | 35( 2) |
| TARAXACUM OFFICINALE | 92( 6) | 80( 6) | 33( T) | 61( 2) | 49( 3) |
| THALICTRUM FENDLERI + | 42( 5) | 27( 5) | 44( 9) | 22( T) | 54(10) |
| THERMOPSIS MONTANA | 8( T) | -( -) | -( -) | 17( 6) | 2( 7) |
| TRAGOPOGON DUBIUS | -( -) | -( -) | -( -) | -( -) | 4( T) |
| TRIFOLIUM GYMNOCARPON | 17( 8) | -( -) | 67( 9) | -( -) | 2( 7) |
| TRIFOLIUM LONGIPES | -( -) | -( -) | -( -) | 11( 2) | 5(11) |
| URTICA DIOICA | -( -) | -( -) | -( -) | -( -) | 2( 1) |
| VALERIANA OCCIDENTALIS | -( -) | -( -) | -( -) | -( -) | 25( 5) |
| VERATRUM CALIFORNICUM | -( -) | -( -) | -( -) | -( -) | 1(17) |
| VERBASCUM THAPSUS | -( -) | -( -) | -( -) | -( -) | 1( T) |
| VICIA AMERICANA | 50( 3) | 27(16) | -( -) | 17( 1) | 16( 6) |
| VIGUIERA MULTIFLORA | -( -) | -( -) | -( -) | -( -) | 3( 2) |
| VIOLA ADUNCA | -( -) | -( -) | -( -) | -( -) | 10( 1) |
| VIOLA NUTTALLII | 33( 4) | -( -) | -( -) | -( -) | 13( 2) |
| VIOLA PURPUREA | -( -) | -( -) | -( -) | -( -) | 2( 1) |
| WYETHIA AMPLEXICAULIS | -( -) | -( -) | -( -) | -( -) | 4(15) |
| ANNUALS | | | | | |
| ANDROSACE SEPTENTRIONALIS | -( -) | -( -) | -( -) | -( -) | 3( 1) |
| CHENOPODIUM FREMONTII | 8( T) | -( -) | -( -) | -( -) | 4( 1) |
| COLLINSIA PARVIFLORA | -( -) | -( -) | 11( 1) | 6( T) | 8( 5) |
| COLLOMIA LINEARIS | -( -) | -( -) | -( -) | -( -) | 11( 2) |
| DESCURAINIA RICHARDSONII | 25( T) | 13( T) | 11( T) | 6( T) | 20( 1) |
| GALIUM APARINE | -( -) | -( -) | -( -) | -( -) | 2( 7) |
| GALIUM BIFOLIUM | -( -) | -( -) | -( -) | -( -) | 15( 5) |
| MADIA GLOMERATA | -( -) | -( -) | -( -) | -( -) | +( 2) |
| NEMOPHILA BREVIFLORA | 8(15) | -( -) | -( -) | -( -) | 18(17) |
| POLYGONUM DOUGLASII | 8( T) | -( -) | -( -) | -( -) | 13( 4) |

## APPENDIX G: PRODUCTIVITY RANGE OF DIFFERENT VEGETATION ELEMENTS IN ASPEN COMMUNITIES OF THE INTERMOUNTAIN REGION

| Vegetation element | Percentile 10 | 25 | 33.3 | 66.6 | 75 | 90 | Maximum value |
|---|---|---|---|---|---|---|---|
| | *Upper production limit of percentile group* | | | | | | |
| Total stand basal area ($ft^2$/acre) | 88 | 113 | 122 | 168 | 183 | 230 | 351 |
| Aspen basal area ($ft^2$/acre) | 79 | 102 | 112 | 155 | 168 | 206 | 342 |
| Aspen site index (ft height at 80 years) | 36 | 41 | 44 | 54 | 56 | 63 | 78 |
| Aspen volume growth ($ft^3$/acre/year) | 21 | 28 | 32 | 44 | 47 | 56 | 76 |
| Aspen reproduction,<3 dm tall (number/acre) | 26 | 90 | 142 | 593 | 928 | 2,650 | 24,940 |
| Aspen reproduction, 3-14 dm tall (number/acre) | 13 | 116 | 193 | 825 | 1,213 | 2,598 | 12,876 |
| Aspen tree density (number/acre) | 335 | 451 | 541 | 850 | 992 | 1,559 | 6,985 |
| Total undergrowth production (lb a.d./acre) | 324 | 571 | 679 | 1,081 | 1,224 | 1,691 | 3,796 |
| Total shrub production (lb a.d./acre) | 5 | 11 | 15 | 128 | 200 | 429 | 1,644 |
| Total forb production (lb a.d./acre) | 73 | 191 | 263 | 568 | 678 | 1,088 | 3,569 |
| Total graminoid production (lb a.d./acre) | 9 | 49 | 87 | 321 | 404 | 698 | 2,587 |
| Total production of annuals (lb a.d./acre) | 0 | 5 | 7 | 17 | 24 | 56 | 487 |
| Desirable forage (percent) | 28 | 40 | 44 | 54 | 57 | 62 | 85 |
| Intermediate forage (percent) | 26 | 34 | 38 | 45 | 46 | 51 | 75 |
| Least desirable forage (percent) | 1 | 3 | 4 | 9 | 13 | 27 | 51 |

## APPENDIX H: MEANS, STANDARD ERRORS, AND RANGES OF TOTAL STAND BASAL AREA, AND THE PERCENTAGE OF THIS BASAL AREA CONSISTING OF CONIFERS, BY COMMUNITY TYPES IN THE INTERMOUNTAIN REGION

| Community type | Stands in data base | Total stand basal area | | Percent conifers |
|---|---|---|---|---|
| | | *m²/ha* | *Ft²/acre* | |
| **Major community types** | | | | |
| POTR/TALL FORB | 64 | | | |
| mean | | 35.6 | 155 | 2 |
| SE | | 1.5 | 7 | |
| range | | 15.3-69.4 | 67-302 | |
| POTR/SYOR/TALL FORB | 41 | | | |
| mean | | 29.8 | 130 | 1 |
| SE | | 1.8 | 8 | |
| range | | 5.1-53.4 | 22-233 | |
| POTR/AMAL-SYOR/ TALL FORB | 28 | | | |
| mean | | 26.5 | 116 | 1 |
| SE | | 1.2 | 5 | |
| range | | 10.4-38.2 | 45-166 | |
| POTR-ABLA/TALL FORB | 17 | | | |
| mean | | 38.9 | 169 | 28 |
| SE | | 3.5 | 15 | |
| range | | 20.4-64.9 | 89-283 | |
| POTR/CARU | 26 | | | |
| mean | | 36.7 | 160 | 1 |
| SE | | 2.5 | 11 | |
| range | | 13.9-73.9 | 61-322 | |
| POTR/SYOR/CARU | 20 | | | |
| mean | | 35.6 | 155 | 1 |
| SE | | 2.8 | 12 | |
| range | | 17.6-67.0 | 76-292 | |
| POTR/AMAL-SYOR/CARU | 32 | | | |
| mean | | 26.9 | 117 | 1 |
| SE | | 1.3 | 6 | |
| range | | 8.2-42.8 | 36-186 | |
| POTR/THFE | 24 | | | |
| mean | | 38.7 | 169 | 11 |
| SE | | 2.7 | 12 | |
| range | | 13.5-64.5 | 59-281 | |
| POTR/SYOR/THFE | 12 | | | |
| mean | | 29.2 | 127 | 4 |
| SE | | 2.3 | 10 | |
| range | | 16.9-41.9 | 74-183 | |
| POTR/AMAL-SYOR/THFE | 6 | | | |
| mean | | 30.9 | 134 | 2 |
| SE | | 3.4 | 15 | |
| range | | 21.9-46.4 | 95-202 | |
| POTR/CARO | 11 | | | |
| mean | | 43.8 | 191 | 3 |
| SE | | 3.3 | 14 | |
| range | | 22.5-62.6 | 98-273 | |
| POTR-ABLA/CARO | 16 | | | |
| mean | | 43.7 | 190 | 24 |
| SE | | 3.3 | 14 | |
| range | | 25.1-71.9 | 109-313 | |
| POTR/BRCA | 32 | | | |
| mean | | 34.1 | 149 | 2 |
| SE | | 2.4 | 11 | |
| range | | 9.0-60.5 | 39-264 | |

| Community type | Stands in data base | Total stand basal area | | Percent conifers |
|---|---|---|---|---|
| | | *m²/ha* | *Ft²/acre* | |
| POTR/SYOR/BRCA | 10 | | | |
| mean | | 23.8 | 104 | 2 |
| SE | | 1.0 | 4 | |
| range | | 16.1-28.3 | 70-123 | |
| **Minor community types** | | | | |
| POTR/WYAM | 2 | | | |
| mean | | 17.0 | 74 | 0 |
| SE | | 8.8 | 38 | |
| range | | 8.3-25.8 | 36-112 | |
| POTR/ARTR | 3 | | | |
| mean | | 12.8 | 56 | 8 |
| SE | | 1.2 | 5 | |
| range | | 10.9-15.0 | 47-65 | |
| POTR/JUCO/CAGE | 3 | | | |
| mean | | 37.2 | 162 | T[1] |
| SE | | 8.3 | 36 | |
| range | | 20.8-47.5 | 90-207 | |
| POTR/POPR | 8 | | | |
| mean | | 43.7 | 190 | 2 |
| SE | | 5.5 | 24 | |
| range | | 26.6-64.3 | 116-280 | |
| POTR/SYOR/POPR | 11 | | | |
| mean | | 24.4 | 106 | 1 |
| SE | | 3.6 | 16 | |
| range | | 3.3-44.5 | 14-194 | |
| POTR/AMAL/THFE | 4 | | | |
| mean | | 29.6 | 129 | 2 |
| SE | | 2.7 | 12 | |
| range | | 21.5-33.6 | 94-146 | |
| POTR/AMAL/TALL FORB | 9 | | | |
| mean | | 28.4 | 124 | T |
| SE | | 3.7 | 16 | |
| range | | 12.6-44.3 | 55-193 | |
| POTR/AMAL-SYOR/BRCA | 5 | | | |
| mean | | 23.7 | 103 | T |
| SE | | 2.2 | 9 | |
| range | | 17.8-30.7 | 78-134 | |
| POTR-ABLA/SYOR/TALL FORB | 4 | | | |
| mean | | 34.1 | 149 | 12 |
| SE | | 1.5 | 13 | |
| range | | 29.6-35.9 | 129-156 | |
| POTR-ABLA/THFE | 16 | | | |
| mean | | 47.0 | 205 | 29 |
| SE | | 3.6 | 16 | |
| range | | 25.0-74.1 | 109-323 | |
| POTR-ABCO/SYOR | 4 | | | |
| mean | | 45.6 | 199 | 38 |
| SE | | 2.0 | 9 | |
| range | | 40.7-49.3 | 177-215 | |
| **Incidental community types** | | | | |
| POTR/VECA | 1 | | | |
| mean | | 16.4 | 71 | 0 |
| SE | | — | — | |
| range | | — | — | |

(con.)

## APPENDIX H (Con.)

| Community type | Stands in data base | Total stand basal area | | Percent conifers |
|---|---|---|---|---|
| | | m²/ha | Ft²/acre | |
| POTR/RUPA | 1 | | | |
| mean | | 17.0 | 74 | 13 |
| SE | | — | — | |
| range | | — | — | |
| POTR/SARA | 6 | | | |
| mean | | 31.3 | 137 | 1 |
| SE | | 4.9 | 22 | |
| range | | 16.1-47.1 | 70-205 | |
| POTR/PTAQ | 5 | | | |
| mean | | 33.6 | 146 | 1 |
| SE | | 5.5 | 24 | |
| range | | 17.3-51.4 | 76-224 | |
| POTR/AMAL/PTAQ | 5 | | | |
| mean | | 31.2 | 136 | T |
| SE | | 2.4 | 11 | |
| range | | 25.8-40.0 | 113-174 | |
| POTR/FETH | 6 | | | |
| mean | | 51.4 | 224 | 1 |
| SE | | 8.6 | 37 | |
| range | | 30.8-80.6 | 134-351 | |
| POTR/SYOR/FETH | 1 | | | |
| mean | | 40.9 | 178 | 1 |
| SE | | — | — | |
| range | | — | — | |
| POTR/SYOR/CARO | 3 | | | |
| mean | | 35.8 | 156 | 5 |
| SE | | 2.8 | 12 | |
| range | | 33.0-41.4 | 144-180 | |
| POTR/ASMI | 3 | | | |
| mean | | 34.0 | 148 | 1 |
| SE | | 26.4 | 29 | |
| range | | 26.4-47.4 | 115-206 | |
| POTR/JUCO/ASMI | 3 | | | |
| mean | | 35.0 | 152 | 12 |
| SE | | 4.8 | 21 | |
| range | | 29.7-44.6 | 129-194 | |
| POTR/JUCO/LUAR | 1 | | | |
| mean | | 44.3 | 193 | T |
| SE | | — | — | |
| range | | — | — | |
| POTR/STCO | 6 | | | |
| mean | | 34.8 | 152 | 4 |
| SE | | 4.0 | 17 | |
| range | | 21.5-46.6 | 94-203 | |
| POTR/SHCA | 1 | | | |
| mean | | 31.2 | 136 | 0 |
| SE | | — | — | |
| range | | — | — | |
| POTR-ABLA/SHCA | 1 | | | |
| mean | | 39.1 | 170 | 21 |
| SE | | — | — | |
| range | | — | — | |
| POTR-ABLA/AMAL | 5 | | | |
| mean | | 33.5 | 146 | 13 |
| SE | | 9.3 | 40 | |
| range | | 12.1-66.2 | 53-288 | |
| POTR-ABLA/SYOR/BRCA | 1 | | | |
| mean | | 24.3 | 106 | 8 |
| SE | | — | — | |
| range | | — | — | |
| POTR-ABLA/SYOR/THFE | 4 | | | |
| mean | | 44.2 | 192 | 20 |
| SE | | 9.8 | 43 | |
| range | | 15.5-57.3 | 67-249 | |
| POTR-ABLA/JUCO | 1 | | | |
| mean | | 37.1 | 161 | 23 |
| SE | | — | — | |
| range | | — | — | |
| POTR-ABLA/CAGE | 5 | | | |
| mean | | 38.9 | 169 | 14 |
| SE | | 6.2 | 27 | |
| range | | 21.3-58.1 | 93-253 | |
| POTR-PICO/SYOR | 2 | | | |
| mean | | 29.0 | 126 | 12 |
| SE | | 2.5 | 11 | |
| range | | 26.5-31-5 | 115-137 | |
| POTR-PICO/THFE | 1 | | | |
| mean | | 36.9 | 161 | 35 |
| SE | | — | — | |
| range | | — | — | |
| POTR-PICO/CAGE | 5 | | | |
| mean | | 31.8 | 139 | 15 |
| SE | | 3.9 | 17 | |
| range | | 23.8-45.4 | 104-198 | |
| POTR-PSME/AMAL | 5 | | | |
| mean | | 39.0 | 170 | 11 |
| SE | | 7.1 | 31 | |
| range | | 24.2-64.9 | 105-283 | |
| POTR-PSME/SYOR | 6 | | | |
| mean | | 31.5 | 137 | 14 |
| SE | | 2.8 | 12 | |
| range | | 24.2-43.5 | 106-190 | |
| POTR-PSME/JUCO | 1 | | | |
| mean | | 44.2 | 192 | 12 |
| SE | | — | — | |
| range | | — | — | |
| POTR-PSME/CARU | 1 | | | |
| mean | | 38.8 | 169 | 9 |
| SE | | — | — | |
| range | | — | — | |
| POTR-PIPO | 3 | | | |
| mean | | 36.8 | 160 | 28 |
| SE | | 5.1 | 22 | |
| range | | 27.0-44.3 | 118-193 | |
| All stands | 491 | | | |
| mean | | 34.1 | 148 | 7 |
| SE | | 0.6 | 3 | |
| range | | 3.3-80.6 | 14-351 | |

[1]T = less than 0.5 percent.

## APPENDIX I: ASPEN PRODUCTIVITY BY COMMUNITY TYPES WITHIN THE INTERMOUNTAIN REGION; MEANS, STANDARD ERRORS, AND RANGES OF BASAL AREA, SITE INDEX, AND ESTIMATED MEAN ANNUAL TOTAL VOLUME INCREMENT FOR *POPULUS TREMULOIDES*

| Community type | Stands in data base | Basal area | | Site index[1] at 80 years | | Total volume[2] increment/year | |
|---|---|---|---|---|---|---|---|
| | | *m²/ha* | *Ft²/acre* | *m* | *Ft* | *m³/ha* | *Ft³/acre* |
| **Major community types** | | | | | | | |
| POTR/TALL FORB | 64 | | | | | | |
| mean | | 34.8 | 152 | 15.7 | 52 | 2.9 | 41 |
| SE | | 1.6 | 7 | 0.4 | 1 | 0.1 | 2 |
| range | | 15.3-69.4 | 67-302 | 9.9-23.2 | 32-76 | 1.1-5.2 | 16-74 |
| POTR/SYOR/TALL FORB | 41 | | | | | | |
| mean | | 29.7 | 129 | 14.3 | 47 | 2.4 | 35 |
| SE | | 1.8 | 8 | 0.6 | 2 | 0.2 | 2 |
| range | | 5.1-53.4 | 22-233 | 7.8-23.7 | 26-78 | 0.5-5.3 | 7-76 |
| POTR/AMAL-SYOR/ TALL FORB | 28 | | | | | | |
| mean | | 26.4 | 115 | 14.1 | 46 | 2.4 | 34 |
| SE | | 1.2 | 5 | 0.5 | 2 | 0.2 | 2 |
| range | | 10.4-38.2 | 45-166 | 9.4-18.3 | 31-60 | 1.0-3.7 | 14-53 |
| POTR-ABLA/TALL FORB | 17 | | | | | | |
| mean | | 28.0 | 122 | 16.6 | 55 | 3.2 | 45 |
| SE | | 2.1 | 9 | 0.7 | 2 | 0.2 | 3 |
| range | | 16.3-45.5 | 71-198 | 10.1-20.1 | 33-66 | 1.2-4.2 | 17-60 |
| POTR/CARU | 26 | | | | | | |
| mean | | 36.5 | 159 | 15.5 | 51 | 2.8 | 40 |
| SE | | 2.5 | 11 | 0.6 | 2 | 0.2 | 3 |
| range | | 13.9-73.9 | 61-322 | 9.5-21.5 | 31-71 | 1.0-4.6 | 15-66 |
| POTR/SYOR/CARU | 20 | | | | | | |
| mean | | 35.3 | 154 | 16.1 | 53 | 3.0 | 43 |
| SE | | 2.8 | 12 | 0.7 | 2 | 0.2 | 3 |
| range | | 16.8-67.0 | 73-292 | 11.2-23.2 | 37-76 | 1.5-5.1 | 22-73 |
| POTR/AMAL-SYOR/CARU | 32 | | | | | | |
| mean | | 26.6 | 116 | 14.9 | 49 | 2.6 | 38 |
| SE | | 1.3 | 6 | 0.5 | 2 | 0.1 | 2 |
| range | | 8.2-42.8 | 36-186 | 10.1-20.6 | 33-67 | 1.2-4.4 | 17-62 |
| POTR/THFE | 24 | | | | | | |
| mean | | 34.6 | 151 | 14.4 | 47 | 2.5 | 36 |
| SE | | 2.4 | 10 | 0.7 | 2 | 0.2 | 3 |
| range | | 13.5-64.3 | 59-280 | 9.7-23.0 | 32-75 | 1.1-5.1 | 15-73 |
| POTR/SYOR/THFE | 12 | | | | | | |
| mean | | 28.0 | 122 | 14.6 | 48 | 2.5 | 36 |
| SE | | 2.2 | 10 | 0.9 | 3 | 0.3 | 4 |
| range | | 16.9-41.9 | 74-183 | 10.7-19.7 | 35-65 | 1.4-4.1 | 20-58 |
| POTR/AMAL-SYOR/THFE | 6 | | | | | | |
| mean | | 3.03 | 132 | 13.0 | 43 | 2.1 | 30 |
| SE | | 3.7 | 16 | 1.1 | 4 | 0.3 | 5 |
| range | | 18.7-46.4 | 81-202 | 10.7-17.1 | 35-56 | 1.4-3.3 | 19-47 |
| POTR/CARO | 11 | | | | | | |
| mean | | 42.4 | 185 | 15.2 | 50 | 2.7 | 39 |
| SE | | 3.2 | 14 | 0.7 | 2 | 0.2 | 3 |
| range | | 21.7-62.6 | 94-273 | 9.9-19.3 | 32-63 | 1.1-4.0 | 16-57 |
| POTR-ABLA/CARO | 16 | | | | | | |
| mean | | 33.3 | 145 | 13.3 | 44 | 2.1 | 31 |
| SE | | 3.1 | 13 | 0.5 | 2 | 0.2 | 2 |
| range | | 14.0-54.6 | 61-238 | 9.2-16.3 | 30-54 | 0.9-3.1 | 13-44 |

(con.)

| Community type | Stands in data base | Basal area | | Site index[1] at 80 years | | Total volume[2] increment/year | |
|---|---|---|---|---|---|---|---|
| | | *m²/ha* | *Ft²/acre* | *m* | *Ft* | *m³/ha* | *Ft³/acre* |
| POTR/BRCA | 32 | | | | | | |
| mean | | 33.3 | 145 | 16.3 | 54 | 3.1 | 44 |
| SE | | 2.3 | 10 | 0.5 | 2 | 0.1 | 2 |
| range | | 9.0-56.9 | 39-248 | 12.0-23.4 | 39-77 | 1.8-5.2 | 25-74 |
| POTR/SYOR/BRCA | 10 | | | | | | |
| mean | | 23.2 | 101 | 14.5 | 47 | 2.5 | 36 |
| SE | | 1.0 | 5 | 0.5 | 2 | 0.2 | 2 |
| range | | 16.0-28.3 | 70-123 | 11.2-16.8 | 37-55 | 1.5-3.2 | 22-46 |
| **Minor community types** | | | | | | | |
| POTR/WYAM | 2 | | | | | | |
| mean | | 17.0 | 74 | 9.1 | 30 | 0.9 | 13 |
| SE | | 8.8 | 38 | 1.0 | 3 | 0.3 | 4 |
| range | | 8.2-25.8 | 36-112 | 8.1-10.0 | 27-33 | 0.6-1.2 | 8-17 |
| POTR/ARTR | 3 | | | | | | |
| mean | | 11.7 | 51 | 8.9 | 29 | 0.8 | 12 |
| SE | | 1.6 | 7 | 1.3 | 4 | 0.4 | 6 |
| range | | 9.8-15.0 | 43-65 | 7.2-11.5 | 24-38 | 0.3-1.6 | 4-23 |
| POTR/JUCO/CAGE | 3 | | | | | | |
| mean | | 37.2 | 162 | 14.5 | 48 | 2.5 | 36 |
| SE | | 8.3 | 36 | 1.8 | 6 | 0.5 | 8 |
| range | | 20.8-47.5 | 90-207 | 11.2-17.3 | 37-57 | 1.5-3.4 | 22-48 |
| POTR/POPR | 8 | | | | | | |
| mean | | 42.9 | 187 | 16.4 | 54 | 3.1 | 44 |
| SE | | 5.5 | 24 | 1.1 | 4 | 0.3 | 5 |
| range | | 25.3-64.3 | 110-280 | 10.7-20.8 | 35-68 | 1.4-4.4 | 20-63 |
| POTR/SYOR/POPR | 11 | | | | | | |
| mean | | 24.1 | 105 | 15.3 | 50 | 2.8 | 40 |
| SE | | 3.4 | 16 | 0.8 | 3 | 0.2 | 3 |
| range | | 3.3-44.5 | 14-194 | 11.9-20.5 | 39-67 | 1.7-4.3 | 25-62 |
| POTR/AMAL/THFE | 4 | | | | | | |
| mean | | 29.1 | 127 | 13.8 | 45 | 2.3 | 33 |
| SE | | 2.7 | 12 | 2.0 | 7 | 0.6 | 9 |
| range | | 21.5-33.6 | 94-146 | 10.2-19.4 | 34-64 | 1.2-4.0 | 17-57 |
| POTR/AMAL/TALL FORB | 9 | | | | | | |
| mean | | 28.3 | 123 | 14.5 | 47 | 2.5 | 36 |
| SE | | 3.7 | 16 | 1.1 | 4 | 0.3 | 5 |
| range | | 12.6-44.3 | 55-193 | 9.3-20.2 | 31-66 | 1.0-4.2 | 14-61 |
| POTR/AMAL-SYOR/BRCA | 5 | | | | | | |
| mean | | 23.7 | 103 | 14.8 | 49 | 2.6 | 37 |
| SE | | 2.2 | 9 | 0.9 | 3 | 0.3 | 4 |
| range | | 17.9-30.7 | 78-134 | 12.4-17.3 | 41-57 | 1.9-3.4 | 27-48 |
| POTR-ABLA/SYOR/ TALL FORB | 4 | | | | | | |
| mean | | 30.0 | 131 | 15.4 | 51 | 2.9 | 40 |
| SE | | 1.2 | 5 | 1.7 | 6 | 0.5 | 7 |
| range | | 27.3-32.4 | 119-141 | 11.5-18.6 | 38-61 | 1.6-3.7 | 23-54 |
| POTR-ABLA/THFE | 16 | | | | | | |
| mean | | 33.2 | 145 | 15.0 | 49 | 2.7 | 38 |
| SE | | 3.3 | 15 | 0.8 | 2 | 0.2 | 3 |
| range | | 10.8-65.0 | 47-283 | 10.1-20.7 | 33-68 | 1.2-4.4 | 17-63 |
| POTR-ABCO/SYOR | 4 | | | | | | |
| mean | | 28.1 | 122 | 11.2 | 37 | 1.5 | 22 |
| SE | | 2.2 | 10 | 0.6 | 2 | 0.2 | 3 |
| range | | 25.1-34.7 | 110-151 | 9.7-12.3 | 32-40 | 1.1-1.9 | 15-26 |

(con.)

## APPENDIX I (Con.)

| Community type | Stands in data base | Basal area | | Site index[1] at 80 years | | Total volume[2] increment/year | |
|---|---|---|---|---|---|---|---|
| | | *m²/ha* | *Ft²/acre* | *m* | *Ft* | *m³/ha* | *Ft³/acre* |
| **Incidental community types** | | | | | | | |
| POTR/VECA | 1 | | | | | | |
| mean | | 16.4 | 71 | 20.4 | 67 | 4.3 | 61 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR/RUPA | 1 | | | | | | |
| mean | | 14.8 | 64 | 19.9 | 65 | 4.2 | 60 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR/SARA | 6 | | | | | | |
| mean | | 31.0 | 135 | 15.2 | 50 | 2.7 | 39 |
| SE | | 5.0 | 22 | 1.3 | 4 | 0.4 | 6 |
| range | | 16.1-47.0 | 70-205 | 11.0-18.2 | 36-60 | 1.5-3.6 | 21-52 |
| POTR/PTAQ | 5 | | | | | | |
| mean | | 33.4 | 145 | 17.5 | 57 | 3.4 | 49 |
| SE | | 5.6 | 24 | 1.6 | 5 | 0.5 | 7 |
| range | | 16.6-51.4 | 72-224 | 13.9-22.3 | 46-73 | 2.3-4.9 | 33-70 |
| POTR/AMAL/PTAQ | 5 | | | | | | |
| mean | | 31.2 | 136 | 17.3 | 57 | 3.4 | 48 |
| SE | | 2.4 | 10 | 1.5 | 5 | 0.4 | 6 |
| range | | 25.8-40.0 | 113-174 | 12.7-21.6 | 42-71 | 2.0-4.7 | 28-67 |
| POTR/FETH | 6 | | | | | | |
| mean | | 51.0 | 222 | 17.0 | 56 | 3.3 | 47 |
| SE | | 8.3 | 36 | 0.7 | 2 | 0.2 | 3 |
| range | | 30.7-78.4 | 134-342 | 14.5-19.8 | 48-65 | 2.5-4.1 | 36-59 |
| POTR/SYOR/FETH | 1 | | | | | | |
| mean | | 40.6 | 177 | 15.0 | 49 | 2.7 | 38 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR/SYOR/CARO | 3 | | | | | | |
| mean | | 34.0 | 148 | 14.0 | 46 | 2.4 | 34 |
| SE | | 2.3 | 10 | 0.7 | 2 | 0.2 | 3 |
| range | | 30.6-38.5 | 133-168 | 13.1-15.3 | 43-50 | 2.1-2.8 | 30-39 |
| POTR/ASMI | 3 | | | | | | |
| mean | | 33.8 | 147 | 11.8 | 39 | 1.7 | 24 |
| SE | | 6.8 | 30 | 0.8 | 3 | 0.2 | 3 |
| range | | 25.8-47.4 | 112-206 | 10.2-12.7 | 34-42 | 1.2-2.0 | 18-28 |
| POTR/JUCO/ASMI | 3 | | | | | | |
| mean | | 30.8 | 134 | 12.1 | 40 | 1.8 | 25 |
| SE | | 3.1 | 14 | 1.1 | 3 | 0.3 | 5 |
| range | | 25.5-36.4 | 111-158 | 10.0-13.6 | 33-45 | 1.2-2.2 | 17-32 |
| POTR/JUCO/LUAR | 1 | | | | | | |
| mean | | 44.3 | 193 | 13.5 | 44 | 2.2 | 32 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR/STCO | 6 | | | | | | |
| mean | | 33.4 | 146 | 13.1 | 43 | 2.1 | 30 |
| SE | | 3.9 | 17 | 1.2 | 4 | 0.4 | 5 |
| range | | 21.3-45.5 | 93-198 | 9.0-17.7 | 30-58 | 0.9-3.5 | 12-50 |
| POTR/SHCA | 1 | | | | | | |
| mean | | 31.2 | 136 | 14.9 | 49 | 2.6 | 38 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |

(con.)

## APPENDIX I (Con.)

| Community type | Stands in data base | Basal area | | Site index[1] at 80 years | | Total volume[2] increment/year | |
|---|---|---|---|---|---|---|---|
| | | *m²/ha* | *Ft²/acre* | *m* | *Ft* | *m³/ha* | *Ft³/acre* |
| POTR-ABLA/SHCA | 1 | | | | | | |
| mean | | 30.9 | 135 | 13.2 | 43 | 2.1 | 30 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-ABLA/AMAL | 5 | | | | | | |
| mean | | 29.1 | 127 | 16.2 | 53 | 3.0 | 43 |
| SE | | 8.3 | 36 | 0.8 | 3 | 0.2 | 4 |
| range | | 9.9-58.6 | 43-255 | 14.7-19.2 | 48-63 | 2.6-4.0 | 37-56 |
| POTR-ABLA/SYOR/BRCA | 1 | | | | | | |
| mean | | 22.2 | 97 | 13.7 | 45 | 2.3 | 33 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-ABLA/SYOR/THFE | 4 | | | | | | |
| mean | | 35.5 | 155 | 14.5 | 48 | 2.5 | 36 |
| SE | | 9.1 | 39 | 2.4 | 8 | 0.7 | 11 |
| range | | 9.0-48.9 | 39-213 | 8.7-20.1 | 29-66 | 0.8-4.2 | 11-60 |
| POTR-ABLA/JUCO | 1 | | | | | | |
| mean | | 28.5 | 124 | 17.1 | 56 | 3.3 | 47 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-ABLA/CAGE | 5 | | | | | | |
| mean | | 33.4 | 146 | 14.0 | 46 | 2.4 | 34 |
| SE | | 5.3 | 23 | 2.3 | 8 | 0.7 | 10 |
| range | | 15.1-46.8 | 66-204 | 7.2-18.1 | 24-59 | 0.3-3.6 | 4-52 |
| POTR-PICO/SYOR | 2 | | | | | | |
| mean | | 25.6 | 111 | 11.7 | 39 | 1.7 | 24 |
| SE | | 3.3 | 14 | 0.5 | 2 | 0.1 | 2 |
| range | | 22.3-28.8 | 97-126 | 11.3-12.2 | 37-40 | 1.5-1.8 | 22-26 |
| POTR-PICO/THFE | 1 | | | | | | |
| mean | | 23.5 | 103 | 13.9 | 46 | 2.3 | 33 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-PICO/CAGE | 5 | | | | | | |
| mean | | 27.2 | 119 | 14.0 | 46 | 2.4 | 34 |
| SE | | 4.0 | 17 | 1.9 | 6 | 0.6 | 8 |
| range | | 19.4-41.8 | 84-182 | 11.6-21.4 | 38-70 | 1.6-4.6 | 24-66 |
| POTR-PSME/AMAL | 5 | | | | | | |
| mean | | 34.6 | 151 | 17.2 | 56 | 3.3 | 48 |
| SE | | 7.8 | 34 | 0.8 | 2 | 0.2 | 3 |
| range | | 19.6-62.9 | 85-274 | 14.5-18.5 | 48-61 | 2.5-3.7 | 36-53 |
| POTR-PSME/SYOR | 6 | | | | | | |
| mean | | 27.0 | 118 | 16.3 | 54 | 3.1 | 44 |
| SE | | 2.5 | 11 | 1.3 | 4 | 0.4 | 6 |
| range | | 20.9-36.9 | 91-161 | 11.0-19.1 | 36-63 | 1.5-3.9 | 21-56 |
| POTR-PSME/JUCO | 1 | | | | | | |
| mean | | 39.0 | 170 | 17.0 | 56 | 3.3 | 47 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-PSME/CARU | 1 | | | | | | |
| mean | | 35.4 | 154 | 15.7 | 52 | 2.9 | 41 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |

(con.)

## APPENDIX I (Con.)

| Community type | Stands in data base | Basal area | | Site index[1] at 80 years | | Total volume[2] increment/year | |
|---|---|---|---|---|---|---|---|
| | | *m²/ha* | *Ft²/acre* | *m* | *Ft* | *m³/ha* | *Ft³/acre* |
| POTR-PIPO | 3 | | | | | | |
| mean | | 26.4 | 115 | 13.9 | 46 | 2.3 | 33 |
| SE | | 1.4 | 6 | 1.3 | 4 | 0.4 | 6 |
| range | | 24.5-29.1 | 107-127 | 12.3-16.6 | 40-54 | 1.8-3.1 | 26-45 |
| All stands | 491 | | | | | | |
| mean | | 31.7 | 138 | 15.0 | 49 | 2.7 | 38 |
| SE | | 0.5 | 2 | 0.1 | 1 | 0.1 | 1 |
| range | | 3.3-78.4 | 14-342 | 7.2-23.7 | 24-78 | 0.3-5.3 | 4-76 |

[1]Site index using relationships developed by Edminster and others (1985).
[2]Net volume at culmation of growth, based on site index only, after Mowrer (1986).

# APPENDIX J: ASPEN REPRODUCTION IN TWO HEIGHT CLASSES AND DENSITY OF ASPEN TREES BY COMMUNITY TYPE WITHIN THE INTERMOUNTAIN REGION

| Community type | Stands in data base | Aspen reproduction <3 dm | Aspen reproduction 3-14 dm | Tree density | Aspen reproduction <12 in | Aspen reproduction 12-55 in | Tree density |
|---|---|---|---|---|---|---|---|
| | | No./ha | | | No./acre | | |
| **Major community types** | | | | | | | |
| POTR/TALL FORB | 64 | | | | | | |
| mean | | 2,703 | 3,852 | 2,401 | 1,094 | 1,559 | 972 |
| SE | | 445 | 645 | 222 | 180 | 261 | 90 |
| range | | 0-16,179 | 0-26,242 | 316-9,203 | 0-6,547 | 0-10,620 | 128-3,725 |
| POTR/SYOR/TALL FORB | 41 | | | | | | |
| mean | | 2,383 | 1,571 | 2,112 | 964 | 636 | 855 |
| SE | | 1,511 | 402 | 190 | 612 | 163 | 77 |
| range | | 0-61,625 | 0-10,573 | 637-6,018 | 0-24,938 | 0-4,279 | 258-2,436 |
| POTR/AMAL-SYOR/ TALL FORB | 28 | | | | | | |
| mean | | 4,121 | 2,154 | 1,932 | 1,668 | 872 | 782 |
| SE | | 1,714 | 652 | 198 | 694 | 264 | 80 |
| range | | 0-45,733 | 0-14,522 | 351-4,521 | 0-18,507 | 0-5,877 | 142-1,830 |
| POTR-ABLA/TALL FORB | 17 | | | | | | |
| mean | | 3,121 | 3,520 | 1,359 | 1,263 | 1,425 | 550 |
| SE | | 773 | 955 | 170 | 313 | 386 | 69 |
| range | | 96-9,554 | 64-14,268 | 509-2,992 | 39-3,866 | 26-5,774 | 206-1,211 |
| POTR/CARU | 26 | | | | | | |
| mean | | 2,347 | 2,860 | 2,411 | 950 | 1,157 | 976 |
| SE | | 551 | 564 | 373 | 223 | 228 | 151 |
| range | | 32-11,210 | 64-11,465 | 702-10,572 | 13-4,537 | 26-4,640 | 284-4,279 |
| POTR/SYOR/CARU | 20 | | | | | | |
| mean | | 2,352 | 2,726 | 2,920 | 952 | 1,103 | 1,182 |
| SE | | 1,275 | 927 | 808 | 516 | 375 | 327 |
| range | | 0-25,478 | 96-18,472 | 763-17,257 | 0-10,310 | 39-7,475 | 309-6,985 |
| POTR/AMAL-SYOR/CARU | 32 | | | | | | |
| mean | | 961 | 1,843 | 1,947 | 389 | 746 | 788 |
| SE | | 187 | 314 | 245 | 76 | 127 | 99 |
| range | | 0-4,013 | 32-7,325 | 605-7,706 | 0-1,624 | 13-2,964 | 245-3,119 |
| POTR/THFE | 24 | | | | | | |
| mean | | 1,916 | 2,322 | 2,678 | 775 | 940 | 1,084 |
| SE | | 729 | 542 | 398 | 295 | 219 | 161 |
| range | | 0-17,835 | 0-9,554 | 605-8,820 | 0-7,217 | 0-3,866 | 245-3,570 |
| POTR/SYOR/THFE | 12 | | | | | | |
| mean | | 1,292 | 1,757 | 2,871 | 523 | 711 | 1,162 |
| SE | | 409 | 530 | 961 | 166 | 214 | 389 |
| range | | 191-5,096 | 0-5,669 | 1,018-12,546 | 77-2,062 | 0-2,294 | 412-5078 |
| POTR/AMAL-SYOR/THFE | 6 | | | | | | |
| mean | | 1,640 | 4,984 | 2,649 | 664 | 2,017 | 1,072 |
| SE | | 1,432 | 4,586 | 1,161 | 580 | 1856 | 470 |
| range | | 32-8,790 | 0-27,898 | 731-8,215 | 13-3,557 | 0-11,290 | 296-3,325 |
| POTR/CARO | 11 | | | | | | |
| mean | | 1,630 | 1,393 | 2,194 | 660 | 564 | 888 |
| SE | | 279 | 652 | 598 | 113 | 264 | 242 |
| range | | 605-3,345 | 0-5,892 | 731-7,545 | 245-1,353 | 0-2,384 | 296-3,054 |
| POTR-ABLA/CARO | 16 | | | | | | |
| mean | | 4,337 | 991 | 1,806 | 1,755 | 401 | 731 |
| SE | | 1,347 | 419 | 380 | 545 | 170 | 154 |
| range | | 0-20,988 | 0-5,828 | 222-6,051 | 0-8,493 | 0-2,358 | 90-2,449 |
| POTR/BRCA | 32 | | | | | | |
| mean | | 3,197 | 3,594 | 1,939 | 1,294 | 1,454 | 785 |
| SE | | 872 | 877 | 227 | 353 | 355 | 92 |
| range | | 0-20,382 | 0-19,109 | 319-6,018 | 0-8,248 | 0-7,733 | 129-2,436 |

(con.)

## APPENDIX J (Con.)

| Community type | Stands in data base | Aspen reproduction <3 dm | Aspen reproduction 3-14 dm | Tree density | Aspen reproduction <12 in | Aspen reproduction 12-55 in | Tree density |
|---|---|---|---|---|---|---|---|
| | | No./ha | | | No./acre | | |
| POTR/SYOR/BRCA | 10 | | | | | | |
| mean | | 7,319 | 8,621 | 2,483 | 2,962 | 3,489 | 1,005 |
| SE | | 3,116 | 4,015 | 531 | 1,261 | 1,625 | 215 |
| range | | 0-25,860 | 0-31,816 | 924-6,399 | 0-10,465 | 0-12,875 | 374-2,590 |
| **Minor community types** | | | | | | | |
| POTR/WYAM | 2 | | | | | | |
| mean | | 127 | 494 | 1,640 | 52 | 200 | 664 |
| SE | | 0 | 462 | 366 | 0 | 187 | 148 |
| range | | 127-127 | 32-955 | 1,275-2,006 | 52-52 | 13-387 | 516-812 |
| POTR/ARTR | 3 | | | | | | |
| mean | | 1,178 | 3,429 | 1,349 | 477 | 1,388 | 546 |
| SE | | 683 | 2,056 | 430 | 277 | 832 | 174 |
| range | | 64-2,420 | 223-7,261 | 796-2,196 | 26-979 | 90-2,938 | 322-889 |
| POTR/JUCO/CAGE | 3 | | | | | | |
| mean | | 1,773 | 2,123 | 2,080 | 717 | 859 | 842 |
| SE | | 1,662 | 2,123 | 484 | 672 | 859 | 196 |
| range | | 64-5,096 | 0-6,370 | 1,433-3,024 | 26-2,062 | 0-2,578 | 580-1,224 |
| POTR/POPR | 8 | | | | | | |
| mean | | 585 | 936 | 2,194 | 237 | 379 | 888 |
| SE | | 166 | 484 | 568 | 67 | 196 | 230 |
| range | | 32-1,401 | 0-4,013 | 828-5,954 | 13-567 | 0-1,624 | 335-2,410 |
| POTR/SYOR/POPR | 11 | | | | | | |
| mean | | 1,485 | 1,691 | 1,784 | 601 | 684 | 722 |
| SE | | 806 | 594 | 284 | 326 | 240 | 115 |
| range | | 0-9,172 | 0-6,624 | 415-2,962 | 0-3,712 | 0-2,681 | 168-1,199 |
| POTR/AMAL/THFE | 4 | | | | | | |
| mean | | 6,791 | 6,067 | 3,414 | 2,748 | 2,455 | 1,382 |
| SE | | 3,419 | 1,872 | 348 | 1,384 | 758 | 141 |
| range | | 1,083-15,669 | 1,019-9,682 | 2,419-4,012 | 438-6,341 | 412-3,918 | 979-1,624 |
| POTR/AMAL/TALL FORB | 9 | | | | | | |
| mean | | 9,175 | 3,946 | 1,416 | 3,713 | 1,597 | 573 |
| SE | | 5,902 | 1,304 | 180 | 2,388 | 528 | 73 |
| range | | 255-55,287 | 64-11,210 | 763-2,357 | 103-22,374 | 26-4,537 | 309-954 |
| POTR/AMAL-SYOR/BRCA | 5 | | | | | | |
| mean | | 2,682 | 4,204 | 1,752 | 1,085 | 1,701 | 709 |
| SE | | 1,618 | 3,230 | 358 | 655 | 1,307 | 145 |
| range | | 32-8,917 | 32-17,070 | 1,018-3,120 | 13-3,609 | 13-6,908 | 412-1,263 |
| POTR-ABLA/SYOR/ TALL FORB | 4 | | | | | | |
| mean | | 653 | 1,154 | 1,727 | 264 | 467 | 699 |
| SE | | 308 | 429 | 190 | 125 | 174 | 77 |
| range | | 191-1,529 | 255-2,166 | 1,243-2,164 | 77-619 | 103-876 | 503-876 |
| POTR-ABLA/THFE | 16 | | | | | | |
| mean | | 1,312 | 1,642 | 1,598 | 531 | 665 | 647 |
| SE | | 330 | 601 | 282 | 134 | 243 | 114 |
| range | | 64-4,713 | 0-8,280 | 383-5,030 | 26-1,907 | 0-3,351 | 155-2,036 |
| POTR-ABCO/SYOR | 4 | | | | | | |
| mean | | 32 | 247 | 2,317 | 13 | 100 | 938 |
| SE | | 32 | 247 | 371 | 13 | 100 | 150 |
| range | | 0-127 | 0-987 | 1,337-2,992 | 0-52 | 0-400 | 541-1,211 |
| **Incidental community types** | | | | | | | |
| POTR/VECA | 1 | | | | | | |
| mean | | 2,038 | 3,694 | 988 | 825 | 1,495 | 400 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |

(con.)

| Community type | Stands in data base | Aspen reproduction <3 dm | Aspen reproduction 3-14 dm | Tree density | Aspen reproduction <12 in | Aspen reproduction 12-55 in | Tree density |
|---|---|---|---|---|---|---|---|
| | | No./ha | | | No./acre | | |
| POTR/RUPA | 1 | | | | | | |
| mean | | 159 | 382 | 860 | 64 | 155 | 348 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR/SARA | 6 | | | | | | |
| mean | | 632 | 1,088 | 1,374 | 256 | 440 | 556 |
| SE | | 340 | 463 | 336 | 162 | 187 | 136 |
| range | | 0-2,548 | 0-2,675 | 445-2,644 | 0-1,031 | 0-1,083 | 180-1,070 |
| POTR/PTAQ | 5 | | | | | | |
| mean | | 10,019 | 8,905 | 2,737 | 4,055 | 3,603 | 1,108 |
| SE | | 7,254 | 6,127 | 1,097 | 2,936 | 2,479 | 444 |
| range | | 223-37,899 | 127-31,816 | 828-6,305 | 90-15,337 | 52-2,479 | 335-2,552 |
| POTR/AMAL/PTAQ | 5 | | | | | | |
| mean | | 3,210 | 1,478 | 2,058 | 1,299 | 598 | 833 |
| SE | | 1,465 | 741 | 576 | 593 | 300 | 233 |
| range | | 64-8,662 | 255-4,395 | 670-4,109 | 26-3,506 | 103-1,779 | 271-1,663 |
| POTR/FETH | 6 | | | | | | |
| mean | | 1,109 | 2,341 | 2,653 | 449 | 947 | 1,074 |
| SE | | 332 | 870 | 682 | 134 | 352 | 276 |
| range | | 127-2,357 | 223-5,573 | 763-5,285 | 52-954 | 90-2,255 | 309-2,139 |
| POTR/SYOR/FETH | 1 | | | | | | |
| mean | | 191 | 573 | 1,816 | 77 | 232 | 735 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR/SYOR/CARO | 3 | | | | | | |
| mean | | 425 | 2,877 | 2,229 | 172 | 1,164 | 902 |
| SE | | 77 | 356 | 956 | 31 | 144 | 387 |
| range | | | 318-573 | 2,166-3,248 | 988-4,109 | 129-232 | 876-1,315 |
| POTR/ASMI | 3 | | | | | | |
| mean | | 998 | 658 | 2,261 | 404 | 266 | 915 |
| SE | | 271 | 386 | 544 | 110 | 156 | 220 |
| range | | 637-1,529 | 0-1,338 | 1,497-3,311 | 258-619 | 0-541 | 606-1,340 |
| POTR/JUCO/ASMI | 3 | | | | | | |
| mean | | 255 | 839 | 1,826 | 103 | 339 | 739 |
| SE | | 146 | 728 | 220 | 59 | 294 | 89 |
| range | | 64-541 | 64-2,293 | 1,433-2,196 | 26-219 | 26-928 | 580-889 |
| POTR/JUCO/LUAR | 1 | | | | | | |
| mean | | 1,147 | 96 | 988 | 464 | 39 | 400 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR/STCO | 6 | | | | | | |
| mean | | 637 | 2,006 | 1,448 | 258 | 812 | 586 |
| SE | | 177 | 871 | 188 | 72 | 353 | 76 |
| range | | 32-1,274 | 32-5,924 | 670-1,974 | 13-516 | 13-2,397 | 271-799 |
| POTR/SHCA | 1 | | | | | | |
| mean | | 6,879 | 8,917 | 7,577 | 2,784 | 3,609 | 3,067 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-ABLA/SHCA | 1 | | | | | | |
| mean | | 541 | 32 | 1,910 | 219 | 13 | 773 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-ABLA/AMAL | 5 | | | | | | |
| mean | | 1,930 | 3,306 | 1,388 | 781 | 1,338 | 562 |
| SE | | 1,653 | 1,770 | 316 | 669 | 716 | 128 |
| range | | 64-8,535 | 96-8,153 | 702-2,483 | 26-3,454 | 39-3,299 | 284-1,005 |

(con.)

## APPENDIX J (Con.)

| Community type | Stands in data base | Aspen reproduction <3 dm | Aspen reproduction 3-14 dm | Tree density | Aspen reproduction <12 in | Aspen reproduction 12-55 in | Tree density |
|---|---|---|---|---|---|---|---|
| | | *No./ha* | | | *No./acre* | | |
| POTR-ABLA/SYOR/BRCA | 1 | | | | | | |
| mean | | 2,548 | 5,733 | 2,802 | 1,031 | 2,320 | 1,134 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-ABLA/SYOR/THFE | 4 | | | | | | |
| mean | | 605 | 1,346 | 2,429 | 245 | 545 | 983 |
| SE | | 353 | 961 | 904 | 143 | 389 | 366 |
| range | | 0-1,338 | 0-4,076 | 1,082-5,094 | 0-541 | 0-1,650 | 438-2,062 |
| POTR-ABLA/JUCO | 1 | | | | | | |
| mean | | 287 | 287 | 670 | 116 | 116 | 271 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-ABLA/CAGE | 5 | | | | | | |
| mean | | 783 | 796 | 2,083 | 317 | 322 | 843 |
| SE | | 268 | 318 | 413 | 108 | 128 | 167 |
| range | | 64-1,338 | 0-1,656 | 1,369-3,311 | 26-541 | 0-670 | 554-1,340 |
| POTR-PICO/SYOR | 2 | | | | | | |
| mean | | 271 | 2,213 | 3,454 | 110 | 896 | 1,398 |
| SE | | 207 | 1,736 | 939 | 84 | 702 | 380 |
| range | | 64-478 | 448-3,949 | 2,515-4,395 | 26-193 | 193-1,598 | 1,018-1,779 |
| POTR-PICO/THFE | 1 | | | | | | |
| mean | | 3,726 | 1,401 | 2,293 | 1,508 | 567 | 928 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-PICO/CAGE | 5 | | | | | | |
| mean | | 554 | 1,057 | 1,433 | 224 | 428 | 580 |
| SE | | 114 | 438 | 430 | 46 | 177 | 174 |
| range | | 255-892 | 96-2,611 | 413-2,992 | 103-361 | 39-1,057 | 167-1,211 |
| POTR-PSME/AMAL | 5 | | | | | | |
| mean | | 3,841 | 2,828 | 1,680 | 1,554 | 1,144 | 680 |
| SE | | 1,915 | 1,824 | 425 | 775 | 738 | 172 |
| range | | 255-10,573 | 318-9,936 | 445-2,962 | 103-4,279 | 129-4,021 | 180-1,199 |
| POTR-PSME/SYOR | 6 | | | | | | |
| mean | | 584 | 1,009 | 1,092 | 236 | 408 | 442 |
| SE | | 196 | 297 | 84 | 79 | 120 | 34 |
| range | | 96-1,274 | 127-2,293 | 763-1,369 | 39-516 | 52-928 | 309-554 |
| POTR-PSME/JUCO | 1 | | | | | | |
| mean | | 191 | 0 | 1,243 | 77 | 0 | 503 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-PSME/CARU | 1 | | | | | | |
| mean | | 3,376 | 1,274 | 1,401 | 1,366 | 516 | 567 |
| SE | | — | — | — | — | — | — |
| range | | — | — | — | — | — | — |
| POTR-PIPO | 3 | | | | | | |
| mean | | 393 | 1,051 | 1,868 | 159 | 425 | 756 |
| SE | | 250 | 332 | 840 | 101 | 135 | 340 |
| range | | 127-892 | 510-1,656 | 860-3,535 | 52-361 | 206-670 | 348-1,431 |
| All stands | 491 | | | | | | |
| mean | | 2,523 | 2,634 | 2,125 | 1,021 | 1,066 | 860 |
| SE | | 257 | 194 | 77 | 104 | 79 | 31 |
| range | | 0-61,625 | 0-31,816 | 222-17,257 | 0-24,938 | 0-12,875 | 90-6,985 |

## APPENDIX K: PROPORTION OF YEARLY UNDERGROWTH PRODUCTION IN DIFFERENT VEGETATION CATEGORIES BY COMMUNITY TYPE, AND THE SUITABILITY OF THIS UNDERGROWTH AS LIVESTOCK FORAGE

| Community type | Vegetation categories[1] | | | Forage suitability[2] | | |
|---|---|---|---|---|---|---|
| | Shrubs | Forbs | Graminoids | Desirable | Intermediate | Least |
| | Percent | | | | | |
| **Major community types** | | | | | | |
| POTR/TALL FORB | 5 | 78 | 17 | 53 | 26 | 21 |
| POTR/SYOR/TALL FORB | 19 | 63 | 18 | 53 | 32 | 15 |
| POTR/AMAL-SYOR/TALL FORB | 27 | 48 | 25 | 54 | 40 | 6 |
| POTR-ABLA/TALL FORB | 5 | 77 | 18 | 43 | 30 | 27 |
| POTR/CARU | 2 | 39 | 59 | 67 | 31 | 2 |
| POTR/SYOR/CARU | 11 | 42 | 47 | 57 | 41 | 2 |
| POTR/AMAL-SYOR/CARU | 28 | 33 | 39 | 59 | 39 | 2 |
| POTR/THFE | 9 | 59 | 32 | 49 | 38 | 13 |
| POTR/SYOR/THFE | 17 | 42 | 41 | 45 | 51 | 4 |
| POTR/AMAL-SYOR/THFE | 28 | 35 | 37 | 50 | 47 | 3 |
| POTR/CARO | 3 | 34 | 63 | 70 | 28 | 2 |
| POTR-ABLA/CARO | 4 | 60 | 36 | 49 | 47 | 4 |
| POTR/BRCA | 1 | 47 | 52 | 41 | 45 | 14 |
| POTR/SYOR/BRCA | 14 | 47 | 39 | 42 | 46 | 12 |
| **Minor community types** | | | | | | |
| POTR/WYAM | 1 | 89 | 10 | 39 | 28 | 33 |
| POTR/ARTR | 30 | 28 | 42 | 76 | 19 | 5 |
| POTR/JUCO/CAGE | 5 | 50 | 45 | 49 | 38 | 13 |
| POTR/POPR | 9 | 38 | 53 | 23 | 75 | 2 |
| POTR/SYOR/POPR | 22 | 38 | 40 | 28 | 63 | 9 |
| POTR/AMAL/THFE | 39 | 38 | 23 | 40 | 56 | 4 |
| POTR/AMAL/TALL FORB | 30 | 57 | 13 | 48 | 33 | 19 |
| POTR/AMAL-SYOR/BRCA | 12 | 62 | 26 | 50 | 48 | 2 |
| POTR-PICO/JUCO | — | — | — | 38 | 50 | 12 |
| POTR-ABLA/SYOR/TALL FORB | 23 | 46 | 31 | 56 | 35 | 9 |
| POTR-ABLA/THFE | 1 | 86 | 13 | 47 | 45 | 8 |
| POTR-ABCO/SYOR | 50 | 49 | 1 | 55 | 41 | 4 |
| **Incidental community types** | | | | | | |
| POTR/VECA | 1 | 34 | 65 | 35 | 21 | 44 |
| POTR/RUPA | 87 | 10 | 3 | 85 | 14 | 1 |
| POTR/SARA | 42 | 42 | 16 | 66 | 22 | 12 |
| POTR/PTAQ | 2 | 91 | 7 | 28 | 21 | 51 |
| POTR/AMAL/PTAQ | 6 | 87 | 7 | 36 | 30 | 34 |
| POTR/FETH | 1 | 43 | 56 | 52 | 43 | 5 |
| POTR/SYOR/FETH | 40 | 40 | 20 | 52 | 40 | 8 |
| POTR/SYOR/CARO | 34 | 51 | 15 | 51 | 44 | 5 |
| POTR/SYOR/WYAM | — | — | — | 35 | 38 | 27 |
| POTR/ASMI | 11 | 74 | 15 | 26 | 37 | 37 |
| POTR/JUCO/ASMI | 11 | 64 | 25 | 27 | 48 | 2 |
| POTR/JUCO/LUAR | 35 | 25 | 40 | 41 | 46 | 13 |
| POTR/STCO | 2 | 45 | 53 | 59 | 38 | 3 |
| POTR/SHCA | 20 | 45 | 35 | 48 | 46 | 6 |
| POTR-ABLA/SHCA | 90 | 9 | 1 | 49 | 50 | 1 |
| POTR-ABLA/AMAL | 42 | 44 | 14 | 52 | 40 | 8 |
| POTR-ABLA/SYOR/BRCA | — | — | — | 40 | 46 | 14 |
| POTR-ABLA/SYOR/THFE | 14 | 81 | 5 | 60 | 39 | 1 |
| POTR-ABLA/JUCO | 35 | 62 | 3 | 51 | 48 | 1 |
| POTR-ABLA/CAGE | 2 | 55 | 43 | 55 | 41 | 4 |
| POTR-PICO/SYOR | 31 | 54 | 15 | 60 | 39 | 1 |
| POTR-PICO/THFE | — | — | — | 58 | 36 | 6 |
| POTR-PICO/CAGE | 3 | 60 | 37 | 61 | 34 | 5 |
| POTR-PSME/AMAL | 41 | 45 | 14 | 51 | 45 | 4 |
| POTR-PSME/SYOR | 11 | 39 | 50 | 55 | 38 | 7 |
| POTR-PSME/JUCO | — | — | — | 37 | 57 | 6 |
| POTR-PSME/CARU | 1 | 35 | 64 | 64 | 35 | 1 |

(con.)

## APPENDIX K (Con.)

| Community type | Vegetation categories[1] | | | Forage suitability[2] | | |
|---|---|---|---|---|---|---|
| | Shrubs | Forbs | Graminoids | Desirable | Intermediate | Least |
| | Percent | | | | | |
| POTR-PIPO | 23 | 38 | 39 | 58 | 39 | 3 |
| POTR-ABCO/POPR | — | — | — | 38 | 56 | 6 |
| POTR-ABCO/ARPA | — | — | — | 25 | 73 | 2 |
| POTR-PIPU | — | — | — | 44 | 49 | 7 |
| POTR-PIFL | — | — | — | 57 | 39 | 4 |
| All stands | 15 | 55 | 30 | 59 | 32 | 9 |

[1]Based on undergrowth weights from production plots.
[2]Based on proportionate canopy cover in suitability classes described by USDA Forest Service (1981).

# APPENDIX L1: MEANS, STANDARD ERRORS, AND RANGES OF ANNUAL UNDERGROWTH PRODUCTION OF VEGETATION CLASSES BY ASPEN COMMUNITY TYPES, EXPRESSED IN DRY POUNDS PER ACRE

| Community type | Stands in data base-vegetation classes | Shrubs | Forbs[1] | Graminoids | Annuals | Stands in data base-total production | Total lb/acre |
|---|---|---|---|---|---|---|---|
| | | Lb/acre | | | | | |
| **Major community types** | | | | | | | |
| POTR/TALL FORB | 63 | | | | | 88 | |
| mean | | 51 | 862 | 192 | 57 | | 1,107 |
| SE | | 16 | 55 | 25 | 13 | | 57 |
| range | | 0-898 | 104-2,142 | 5-748 | 0-487 | | 148-2,856 |
| POTR/SYOR/TALL FORB | 38 | | | | | 42 | |
| mean | | 235 | 780 | 218 | 42 | | 1,224 |
| SE | | 45 | 75 | 39 | 7 | | 82 |
| range | | 7-1,505 | 169-2,092 | 7-1,127 | 0-206 | | 494-2,462 |
| POTR/AMAL-SYOR/TALL FORB | 28 | | | | | 29 | |
| mean | | 312 | 560 | 289 | 33 | | 1,180 |
| SE | | 41 | 52 | 73 | 12 | | 64 |
| range | | 40-798 | 61-1,329 | 0-1,875 | 0-347 | | 824-2,344 |
| POTR-ABLA/TALL FORB | 16 | | | | | 30 | |
| mean | | 38 | 555 | 130 | 39 | | 917 |
| SE | | 11 | 81 | 38 | 15 | | 97 |
| range | | 0-154 | 47-1,140 | 3-584 | 0-245 | | 90-2,057 |
| POTR/CARU | 26 | | | | | 45 | |
| mean | | 17 | 339 | 511 | 11 | | 973 |
| SE | | 4 | 58 | 54 | 1 | | 59 |
| range | | 0-104 | 43-1,324 | 70-1,113 | 0-41 | | 373-1,892 |
| POTR/SYOR/CARU | 20 | | | | | 31 | |
| mean | | 125 | 491 | 548 | 14 | | 1,309 |
| SE | | 31 | 69 | 82 | 3 | | 107 |
| range | | 13-543 | 151-1,295 | 46-1,297 | 0-46 | | 310-2,721 |
| POTR/AMAL-SYOR/CARU | 32 | | | | | 37 | |
| mean | | 257 | 314 | 362 | 18 | | 1,107 |
| SE | | 38 | 44 | 46 | 3 | | 99 |
| range | | 18-727 | 22-1,402 | 41-1,139 | 0-75 | | 245-3,291 |
| POTR/THFE | 18 | | | | | 48 | |
| mean | | 67 | 424 | 226 | 19 | | 696 |
| SE | | 27 | 78 | 54 | 7 | | 63 |
| range | | 4-482 | 41-1,279 | 3-684 | 0-108 | | 152-2,549 |
| POTR/SYOR/THFE | 12 | | | | | 18 | |
| mean | | 155 | 371 | 366 | 21 | | 881 |
| SE | | 35 | 51 | 115 | 7 | | 83 |
| range | | 26-377 | 180-747 | 6-1,032 | 0-97 | | 427-1,659 |
| POTR/AMAL-SYOR/THFE | 5 | | | | | 7 | |
| mean | | 281 | 345 | 366 | 24 | | 1,099 |
| SE | | 101 | 41 | 68 | 6 | | 187 |
| range | | 39-555 | 241-446 | 278-635 | 9-42 | | 560-1,950 |
| POTR/CARO | 11 | | | | | 12 | |
| mean | | 9 | 86 | 164 | 2 | | 257 |
| SE | | 2 | 19 | 51 | 1 | | 52 |
| range | | 2-19 | 4-204 | 8-515 | 0-6 | | 78-606 |
| POTR-ABLA/CARO | 15 | | | | | 15 | |
| mean | | 8 | 114 | 67 | 1 | | 190 |
| SE | | 4 | 27 | 22 | 1 | | 43 |
| range | | 0-67 | 131-439 | 1-262 | 0-6 | | 4-563 |

(con.)

| Community type | Stands in data base-vegetation classes | Shrubs | Forbs | Graminoids | Annuals | Stands in data base-total production | Total lb/acre |
|---|---|---|---|---|---|---|---|
| | | - - - - - - - | - - - - - Lb/acre | - - - - - - - | - - - - - - - | | |
| POTR/BRCA | 27 | | | | | 28 | |
| mean | | 15 | 530 | 585 | 37 | | 1,111 |
| SE | | 4 | 59 | 61 | 17 | | 74 |
| range | | 0-96 | 63-1,190 | 41-1,202 | 0-482 | | 403-1,922 |
| POTR/SYOR/BRCA | 10 | | | | | 10 | |
| mean | | 138 | 475 | 395 | 13 | | 1,008 |
| SE | | 42 | 202 | 92 | 2 | | 226 |
| range | | 26-480 | 85-2,241 | 80-1,030 | 5-26 | | 387-2,637 |
| **Minor community types** | | | | | | | |
| POTR/WYAM | 2 | | | | | 7 | |
| mean | | 12 | 1,040 | 118 | 22 | | 1,176 |
| SE | | 1 | 44 | 76 | 9 | | 58 |
| range | | 10-13 | 996-1,084 | 42-194 | 13-31 | | 945-1,322 |
| POTR/ARTR | 3 | | | | | 6 | |
| mean | | 259 | 237 | 357 | 15 | | 715 |
| SE | | 112 | 110 | 109 | 7 | | 100 |
| range | | 44-421 | 18-366 | 187-562 | 7-28 | | 248-936 |
| POTR/JUCO/CAGE | 3 | | | | | 3 | |
| mean | | 31 | 321 | 390 | 7 | | 667 |
| SE | | 6 | 52 | 107 | 1 | | 128 |
| range | | 21-42 | 249-421 | 145-500 | 4-8 | | 415-833 |
| POTR/POPR | 8 | | | | | 8 | |
| mean | | 59 | 264 | 365 | 6 | | 689 |
| SE | | 33 | 102 | 51 | 1 | | 105 |
| range | | 0-268 | 8-876 | 167-595 | 0-10 | | 303-1,289 |
| POTR/SYOR/POPR | 11 | | | | | 11 | |
| mean | | 336 | 569 | 609 | 14 | | 1,533 |
| SE | | 93 | 126 | 103 | 3 | | 204 |
| range | | 23-1,142 | 132-1,416 | 175-1,227 | 0-25 | | 654-2,537 |
| POTR/AMAL/THFE | 4 | | | | | 4 | |
| mean | | 385 | 373 | 231 | 8 | | 990 |
| SE | | 145 | 83 | 114 | 3 | | 21 |
| range | | 157-792 | 141-496 | 9-523 | 0-10 | | 942-1,046 |
| POTR/AMAL/TALL FORB | 9 | | | | | 9 | |
| mean | | 336 | 629 | 138 | 42 | | 1,103 |
| SE | | 61 | 102 | 83 | 16 | | 143 |
| range | | 13-651 | 212-1,126 | 8-788 | 5-149 | | 529-1,861 |
| POTR/AMAL-SYOR/BRCA | 4 | | | | | 4 | |
| mean | | 132 | 696 | 292 | 12 | | 1,120 |
| SE | | 62 | 234 | 96 | 7 | | 219 |
| range | | 25-311 | 76-1,102 | 49-477 | 0-31 | | 510-1,554 |
| POTR-ABLA/SYOR/TALL FORB | 3 | | | | | 4 | |
| mean | | 238 | 479 | 329 | 19 | | 910 |
| SE | | 81 | 76 | 191 | 7 | | 224 |
| range | | 107-385 | 357-619 | 44-693 | 7-31 | | 501-1,539 |
| POTR-ABLA/THFE | 12 | | | | | 18 | |
| mean | | 6 | 431 | 65 | 9 | | 496 |
| SE | | 2 | 172 | 30 | 4 | | 117 |
| range | | 0-23 | 7-2,177 | 1-363 | 0-46 | | 8-2,291 |
| POTR-ABCO/SYOR | 4 | | | | | 4 | |
| mean | | 155 | 150 | 5 | 5 | | 310 |
| SE | | 45 | 81 | 1 | 4 | | 63 |
| range | | 69-275 | 15-385 | 2-7 | 0-18 | | 188-458 |

(con.)

## APPENDIX L1 (Con.)

| Community type | Stands in data base-vegetation classes | Shrubs | Forbs | Graminoids | Annuals | Stands in data base-total production | Total lb/acre |
|---|---|---|---|---|---|---|---|
| | | Lb/acre | | | | | |
| **Incidental community types** | | | | | | | |
| POTR/VECA | 1 | | | | | 1 | |
| mean | | 16 | 538 | 1,029 | 16 | | 1,583 |
| SE | | — | — | — | — | | — |
| range | | — | — | — | — | | — |
| POTR/RUPA | 1 | | | | | 2 | |
| mean | | 576 | 66 | 20 | 7 | | 513 |
| SE | | — | — | — | — | | 149 |
| range | | — | — | — | — | | 364-662 |
| POTR/SARA | 6 | | | | | 6 | |
| mean | | 470 | 482 | 178 | 90 | | 1,130 |
| SE | | 102 | 102 | 80 | 32 | | 171 |
| range | | 179-798 | 123-770 | 9-481 | 8-180 | | 778-1,926 |
| POTR/PTAQ | 3 | | | | | 3 | |
| mean | | 34 | 1,425 | 112 | 50 | | 1,571 |
| SE | | 18 | 435 | 58 | 44 | | 375 |
| range | | 10-69 | 829-2,271 | 0-197 | 0-138 | | 1,037-2,294 |
| POTR/AMAL/PTAQ | 5 | | | | | 5 | |
| mean | | 130 | 1,795 | 144 | 19 | | 2,070 |
| SE | | 100 | 499 | 94 | 6 | | 515 |
| range | | 16-530 | 787-3,569 | 8-493 | 0-38 | | 837-3,796 |
| POTR/FETH | 6 | | | | | 6 | |
| mean | | 10 | 460 | 594 | 7 | | 1,064 |
| SE | | 5 | 142 | 403 | 6 | | 496 |
| range | | 0-35 | 88-874 | 12-2,587 | 0-35 | | 289-3,496 |
| POTR/SYOR/FETH | 1 | | | | | 1 | |
| mean | | 310 | 310 | 155 | 8 | | 775 |
| SE | | — | — | — | — | | — |
| range | | — | — | — | — | | — |
| POTR/SYOR/CARO | 3 | | | | | 4 | |
| mean | | 254 | 371 | 113 | 7 | | 673 |
| SE | | 89 | 82 | 43 | 1 | | 71 |
| range | | 100-408 | 286-536 | 33-182 | 7-8 | | 480-816 |
| POTR/ASMI | 3 | | | | | 5 | |
| mean | | 34 | 227 | 45 | 4 | | 395 |
| SE | | 27 | 90 | 7 | 3 | | 101 |
| range | | 4-88 | 47-325 | 33-58 | 0-9 | | 116-737 |
| POTR/JUCO/ASMI | 3 | | | | | 3 | |
| mean | | 31 | 186 | 73 | 4 | | 290 |
| SE | | 14 | 114 | 37 | 3 | | 136 |
| range | | 7-55 | 53-412 | 4-133 | 0-11 | | 88-549 |
| POTR/JUCO/LUAR | 1 | | | | | 2 | |
| mean | | 259 | 185 | 296 | 7 | | 766 |
| SE | | — | — | — | — | | 26 |
| range | | — | — | — | — | | 740-792 |
| POTR/STCO | 6 | | | | | 6 | |
| mean | | 9 | 206 | 244 | 4 | | 460 |
| SE | | 3 | 92 | 56 | 2 | | 78 |
| range | | 3-26 | 7-486 | 26-356 | 0-10 | | 319-823 |
| POTR/SHCA | 1 | | | | | 7 | |
| mean | | 118 | 266 | 207 | 6 | | 1,035 |
| SE | | — | — | — | — | | 183 |
| range | | — | — | — | — | | 592-2,053 |

(con.)

## APPENDIX L1 (Con.)

| Community type | Stands in data base-vegetation classes | Shrubs | Forbs | Graminoids | Annuals | Stands in data base-total production | Total lb/acre |
|---|---|---|---|---|---|---|---|
| | | ---------------- | ---------------- | *Lb/acre* | ---------------- | | |
| POTR-ABLA/SHCA | 1 | | | | | 10 | |
| mean | | 1,644 | 164 | 18 | 18 | | 1,114 |
| SE | | — | — | — | — | | 196 |
| range | | — | — | — | — | | 532-2,473 |
| POTR-ABLA/AMAL | 5 | | | | | 6 | |
| mean | | 476 | 506 | 162 | 57 | | 1,162 |
| SE | | 256 | 110 | 58 | 45 | | 195 |
| range | | 127-1,492 | 278-824 | 12-317 | 0-235 | | 579-1,989 |
| POTR-ABLA SYOR/BRCA | 1 | | | | | 1 | |
| mean | | 11 | 234 | 299 | 44 | | 544 |
| SE | | — | — | — | — | | — |
| range | | — | — | — | — | | — |
| POTR-ABLA/ SYOR/THFE | 4 | | | | | 6 | |
| mean | | 94 | 563 | 33 | 5 | | 757 |
| SE | | 67 | 164 | 25 | 2 | | 123 |
| range | | 22-294 | 172-939 | 2-108 | 0-11 | | 203-1,080 |
| POTR-ABLA/JUCO | 1 | | | | | 1 | |
| mean | | 90 | 160 | 8 | 3 | | 258 |
| SE | | — | — | — | — | | — |
| range | | — | — | — | — | | — |
| POTR-ABLA/CAGE | 5 | | | | | 7 | |
| mean | | 9 | 307 | 235 | 6 | | 617 |
| SE | | 2 | 52 | 88 | 2 | | 83 |
| range | | 6-15 | 205-506 | 31-492 | 0-12 | | 310-946 |
| POTR-PICO/SYOR | 2 | | | | | 3 | |
| mean | | 166 | 285 | 81 | 8 | | 857 |
| SE | | 9 | 154 | 50 | 1 | | 329 |
| range | | 157-175 | 131-439 | 31-131 | 6-9 | | 438-1,506 |
| POTR-PICO/CAGE | 5 | | | | | 5 | |
| mean | | 17 | 374 | 229 | 8 | | 619 |
| SE | | 5 | 120 | 79 | 2 | | 90 |
| range | | 6-33 | 15-660 | 100-524 | 3-13 | | 291-825 |
| PTOR/PSME/AMAL | 5 | | | | | 6 | |
| mean | | 341 | 380 | 121 | 6 | | 922 |
| SE | | 70 | 70 | 47 | 3 | | 133 |
| range | | 156-547 | 191-555 | 6-278 | 0-14 | | 562-1,388 |
| POTR-PSME/SYOR | 5 | | | | | 7 | |
| mean | | 98 | 358 | 458 | 13 | | 1,257 |
| SE | | 46 | 85 | 98 | 4 | | 317 |
| range | | 11-210 | 140-560 | 311-841 | 6-28 | | 588-3,092 |
| POTR-PSME/JUCO | 1 | | | | | 1 | |
| mean | | 9 | 281 | 6 | 0 | | 295 |
| SE | | — | — | — | — | | — |
| range | | — | — | — | — | | — |
| POTR-PSME/CARU | 1 | | | | | 5 | |
| mean | | 5 | 174 | 319 | 5 | | 1,418 |
| SE | | — | — | — | — | | 369 |
| range | | — | — | — | — | | 498-2,610 |
| POTR-PIPO | 3 | | | | | 3 | |
| mean | | 171 | 282 | 282 | 9 | | 735 |
| SE | | 42 | 137 | 21 | 6 | | 185 |
| range | | 86-214 | 64-534 | 248-320 | 0-21 | | 428-1,068 |

(con.)

## APPENDIX L1 (Con.)

| Community type | Stands in data base-vegetation classes | Shrubs | Forbs | Graminoids | Annuals | Stands in data base-total production | Total lb/acre |
|---|---|---|---|---|---|---|---|
| | | - - - - - - - - - | - - - - - - *Lb/acre* | - - - - - - - - | - - - - - - | | |
| All stands | (463) | | | | | 633 | |
| mean | | 139 | 519 | 288 | 26 | | 976 |
| SE | | 10 | 20 | 14 | 3 | | 23 |
| range | | 0-1,644 | 1-3,569 | 0-2,587 | 0-487 | | 4-3,796 |

[1]Forb production includes production of annuals.

## APPENDIX L2: MEANS, STANDARD ERRORS, AND RANGES OF ANNUAL UNDERGROWTH PRODUCTION OF VEGETATION CLASSES BY ASPEN COMMUNITY TYPES, EXPRESSED IN DRY WEIGHT KILOGRAMS PER HECTARE

| Community type | Stands in data base-vegetation classes | Shrubs | Forbs[1] | Graminoids | Annuals | Stands in data base-total production | Total kg/ha |
|---|---|---|---|---|---|---|---|
| | | -kg/ha | | | | | |
| **Major community types** | | | | | | | |
| POTR/TALL FORB | 63 | | | | | 88 | |
| mean | | 57 | 967 | 216 | 64 | | 1,240 |
| SE | | 17 | 62 | 28 | 14 | | 64 |
| range | | 0-1,006 | 117-2,401 | 5-839 | 0-546 | | 166-3,202 |
| POTR/SYOR/TALL FORB | 38 | | | | | 42 | |
| mean | | 263 | 874 | 244 | 47 | | 1,372 |
| SE | | 50 | 84 | 43 | 8 | | 92 |
| range | | 8-1,687 | 190-2,346 | 8-1,264 | 0-231 | | 554-2,760 |
| POTR/AMAL-SYOR/TALL FORB | 28 | | | | | 29 | |
| mean | | 350 | 627 | 324 | 38 | | 1,322 |
| SE | | 45 | 58 | 81 | 14 | | 72 |
| range | | 45-894 | 68-1,490 | 0-2,102 | 0-390 | | 924-2,627 |
| POTR-ABLA/TALL FORB | 16 | | | | | 30 | |
| mean | | 43 | 622 | 146 | 44 | | 1,028 |
| SE | | 13 | 91 | 42 | 17 | | 108 |
| range | | 0-172 | 53-1,279 | 3-655 | 0-274 | | 101-2,306 |
| POTR/CARU | 26 | | | | | 45 | |
| mean | | 19 | 380 | 573 | 12 | | 1,090 |
| SE | | 5 | 64 | 60 | 2 | | 66 |
| range | | 0-117 | 48-1,485 | 79-1,246 | 0-46 | | 418-2,121 |
| POTR/SYOR/CARU | 20 | | | | | 31 | |
| mean | | 140 | 551 | 614 | 15 | | 1,467 |
| SE | | 35 | 77 | 92 | 3 | | 120 |
| range | | 15-609 | 169-1,452 | 52-1,454 | 0-52 | | 347-3,050 |
| POTR/AMAL-SYOR/CARU | 32 | | | | | 37 | |
| mean | | 289 | 352 | 406 | 20 | | 1,241 |
| SE | | 42 | 50 | 51 | 3 | | 111 |
| range | | 20-815 | 25-1,572 | 46-1,277 | 0-84 | | 274-3,690 |
| POTR/THFE | 18 | | | | | 48 | |
| mean | | 75 | 475 | 253 | 21 | | 781 |
| SE | | 31 | 87 | 61 | 8 | | 70 |
| range | | 4-540 | 46-1,433 | 4-767 | 0-121 | | 170-2,858 |
| POTR/SYOR/THFE | 12 | | | | | 18 | |
| mean | | 174 | 416 | 411 | 24 | | 988 |
| SE | | 39 | 57 | 129 | 8 | | 93 |
| range | | 29-423 | 202-837 | 6-1,157 | 0-108 | | 479-1,860 |
| POTR/AMAL-SYOR/THFE | 5 | | | | | 7 | |
| mean | | 315 | 387 | 411 | 27 | | 1,232 |
| SE | | 114 | 46 | 76 | 7 | | 210 |
| range | | 44-623 | 270-500 | 311-711 | 10-47 | | 628-2,186 |
| POTR/CARO | 11 | | | | | 12 | |
| mean | | 10 | 96 | 184 | 2 | | 289 |
| SE | | 2 | 21 | 57 | 1 | | 58 |
| range | | 2-21 | 4-229 | 9-577 | 0-7 | | 88-679 |
| POTR-ABLA/CARO | 15 | | | | | 15 | |
| mean | | 9 | 128 | 76 | 2 | | 213 |
| SE | | 5 | 31 | 25 | 1 | | 49 |
| range | | 0-75 | 1-410 | 2-294 | 0-6 | | 4-632 |
| POTR/BRCA | 27 | | | | | 28 | |
| mean | | 17 | 594 | 656 | 41 | | 1,245 |
| SE | | 4 | 66 | 68 | 19 | | 83 |
| range | | 0-108 | 71-1,334 | 46-1,348 | 0-541 | | 452-2,155 |

(con.)

## APPENDIX L2 (Con.)

| Community type | Stands in data base-vegetation classes | Shrubs | Forbs[1] | Graminoids | Annuals | Stands in data base-total production | Total kg/ha |
|---|---|---|---|---|---|---|---|
| | | -kg/ha- | | | | | |
| POTR/SYOR/BRCA | 10 | | | | | 10 | |
| mean | | 154 | 533 | 442 | 15 | | 1,130 |
| SE | | 47 | 227 | 103 | 3 | | 254 |
| range | | 29-538 | 95-2,513 | 90-1,155 | 5-30 | | 434-2,956 |
| **Minor community types** | | | | | | | |
| POTR/WYAM | 2 | | | | | 7 | |
| mean | | 13 | 1,166 | 132 | 25 | | 1,319 |
| SE | | 1 | 49 | 85 | 10 | | 65 |
| range | | 12-14 | 1,117-1,216 | 47-217 | 14-35 | | 1,060-1,482 |
| POTR/ARTR | 3 | | | | | 6 | |
| mean | | 290 | 266 | 400 | 17 | | 802 |
| SE | | 126 | 124 | 123 | 7 | | 112 |
| range | | 49-472 | 20-410 | 210-630 | 8-31 | | 278-1,049 |
| POTR/JUCO/CAGE | 3 | | | | | 3 | |
| mean | | 36 | 359 | 325 | 7 | | 747 |
| SE | | 7 | 58 | 120 | 1 | | 143 |
| range | | 23-47 | 279-472 | 163-560 | 5-9 | | 465-934 |
| POTR/POPR | 8 | | | | | 8 | |
| mean | | 66 | 296 | 409 | 7 | | 772 |
| SE | | 37 | 114 | 58 | 1 | | 118 |
| range | | 0-301 | 9-982 | 187-667 | 0-11 | | 340-1,445 |
| POTR/SYOR/POPR | 11 | | | | | 11 | |
| mean | | 377 | 638 | 683 | 16 | | 1,719 |
| SE | | 104 | 141 | 115 | 4 | | 229 |
| range | | 26-1,280 | 148-1,588 | 196-1,375 | 0-28 | | 733-2,844 |
| POTR/AMAL/THFE | 4 | | | | | 4 | |
| mean | | 432 | 418 | 259 | 8 | | 1,109 |
| SE | | 163 | 93 | 128 | 3 | | 24 |
| range | | 176-887 | 158-556 | 11-586 | 0-12 | | 1,057-1,172 |
| POTR/AMAL/TALL FORB | 9 | | | | | 9 | |
| mean | | 376 | 706 | 155 | 47 | | 1,237 |
| SE | | 69 | 114 | 93 | 18 | | 161 |
| range | | 15-730 | 237-1,263 | 9-883 | 6-167 | | 593-2,087 |
| POTR/AMAL-SYOR/BRCA | 4 | | | | | 4 | |
| mean | | 148 | 780 | 327 | 14 | | 1,255 |
| SE | | 70 | 262 | 107 | 8 | | 246 |
| range | | 29-348 | 86-1,235 | 55-534 | 0-35 | | 572-1,742 |
| POTR/ABLA/SYOR/TALL FORB | 3 | | | | | 4 | |
| mean | | 266 | 537 | 369 | 21 | | 1,020 |
| SE | | 90 | 85 | 214 | 8 | | 251 |
| range | | 120-431 | 400-694 | 50-776 | 8-35 | | 562-1,725 |
| POTR-ABLA/THFE | 12 | | | | | 18 | |
| mean | | 7 | 483 | 72 | 10 | | 556 |
| SE | | 2 | 193 | 34 | 4 | | 131 |
| range | | 0-26 | 8-2,440 | 1-407 | 0-51 | | 8-2,568 |
| POTR-ABCO/SYOR | 4 | | | | | 4 | |
| mean | | 174 | 168 | 5 | 6 | | 348 |
| SE | | 61 | 91 | 1 | 5 | | 70 |
| range | | 77-309 | 17-431 | 2-8 | 0-21 | | 211-514 |
| **Incidental community types** | | | | | | | |
| POTR/VECA | 1 | | | | | 1 | |
| mean | | 18 | 603 | 1154 | 18 | | 1,775 |
| SE | | — | — | — | — | | — |
| range | | — | — | — | — | | — |

(con.)

## APPENDIX L2 (Con.)

| Community type | Stands in data base-vegetation classes | Shrubs | Forbs[1] | Graminoids | Annuals | Stands in data base-total production | Total kg/ha |
|---|---|---|---|---|---|---|---|
| | | kg/ha | | | | | |
| POTR/RUPA | 1 | | | | | 2 | |
| mean | | 646 | 74 | 22 | 7 | | 575 |
| SE | | — | — | — | — | | 167 |
| range | | — | — | — | — | | 408-742 |
| POTR/SARA | 6 | | | | | 6 | |
| mean | | 527 | 540 | 200 | 101 | | 1,267 |
| SE | | 115 | 114 | 90 | 36 | | 192 |
| range | | 201-895 | 138-864 | 10-540 | 9-201 | | 872-2,159 |
| POTR/PTAQ | 3 | | | | | 3 | |
| mean | | 38 | 1,598 | 125 | 56 | | 1,762 |
| SE | | 20 | 927 | 65 | 50 | | 420 |
| range | | 12-77 | 930-2,546 | 0-221 | 0-155 | | 1,162-2,572 |
| POTR/AMAL/PTAQ | 5 | | | | | 5 | |
| mean | | 146 | 2,012 | 162 | 21 | | 2,320 |
| SE | | 112 | 559 | 105 | 7 | | 577 |
| range | | 18-594 | 882-4,001 | 9-552 | 0-46 | | 938-4,256 |
| POTR/FETH | 6 | | | | | 6 | |
| mean | | 11 | 516 | 666 | 7 | | 1,193 |
| SE | | 6 | 159 | 451 | 6 | | 556 |
| range | | 0-39 | 99-980 | 13-2,900 | 0-39 | | 324-3,919 |
| POTR/SYOR/FETH | 1 | | | | | 1 | |
| mean | | 348 | 348 | 174 | 9 | | 869 |
| SE | | — | — | — | — | | — |
| range | | — | — | — | — | | — |
| POTR/SYOR/CARO | 3 | | | | | 4 | |
| mean | | 285 | 416 | 126 | 8 | | 755 |
| SE | | 100 | 92 | 48 | 1 | | 79 |
| range | | 113-457 | 320-600 | 38-204 | 8-9 | | 538-915 |
| POTR/ASMI | 3 | | | | | 5 | |
| mean | | 39 | 254 | 50 | 5 | | 443 |
| SE | | 30 | 101 | 8 | 3 | | 113 |
| range | | 4-99 | 52-365 | 36-65 | 0-10 | | 130-826 |
| POTR/JUCO/ASMI | 3 | | | | | 3 | |
| mean | | 35 | 208 | 82 | 5 | | 325 |
| SE | | 16 | 127 | 42 | 4 | | 153 |
| range | | 8-62 | 59-462 | 5-149 | 0-12 | | 98-616 |
| POTR/JUCO/LUAR | 1 | | | | | 2 | |
| mean | | 290 | 207 | 332 | 8 | | 859 |
| SE | | — | — | — | — | | 29 |
| range | | — | — | — | — | | 830-888 |
| POTR/STCO | 6 | | | | | 6 | |
| mean | | 10 | 231 | 274 | 5 | | 516 |
| SE | | 4 | 103 | 63 | 2 | | 87 |
| range | | 4-29 | 8-545 | 29-399 | 0-12 | | 358-923 |
| POTR/SHCA | 1 | | | | | 1 | |
| mean | | 133 | 299 | 232 | 7 | | 1,161 |
| SE | | — | — | — | — | | 206 |
| range | | — | — | — | — | | 664-2,302 |
| POTR-ABLA/SHCA | 1 | | | | | 10 | |
| mean | | 1,843 | 184 | 20 | 20 | | 1,249 |
| SE | | — | — | — | — | | 220 |
| range | | — | — | — | — | | 596-2,772 |
| POTR-ABLA/AMAL | 5 | | | | | 6 | |
| mean | | 533 | 567 | 182 | 64 | | 1,303 |
| SE | | 287 | 123 | 65 | 50 | | 218 |
| range | | 142-1,672 | 312-924 | 13-355 | 0-264 | | 649-2,229 |

(con.)

## APPENDIX L2 (Con.)

| Community type | Stands in data base-vegetation classes | Shrubs | Forbs[1] | Graminoids | Annuals | Stands in data base-total production | Total kg/ha |
|---|---|---|---|---|---|---|---|
| | | ------ | ------ | kg/ha | ------ | | |
| POTR-ABLA/SYOR/BRCA | 1 | | | | | 1 | |
| mean | | 12 | 262 | 335 | 49 | | 610 |
| SE | | — | — | — | — | | — |
| range | | — | — | — | — | | — |
| POTR-ABLA/SYOR/THFE | 4 | | | | | 6 | |
| mean | | 106 | 631 | 37 | 6 | | 849 |
| SE | | 75 | 184 | 28 | 3 | | 138 |
| range | | 24-330 | 193-1,053 | 2-121 | 0-12 | | 227-1,210 |
| POTR-ABLA/JUCO | 1 | | | | | 1 | |
| mean | | 101 | 179 | 9 | 3 | | 289 |
| SE | | — | — | — | — | | — |
| range | | — | — | — | — | | — |
| POTR-ABLA/CAGE | 5 | | | | | 7 | |
| mean | | 10 | 344 | 264 | 7 | | 692 |
| SE | | 2 | 58 | 99 | 2 | | 93 |
| range | | 7-17 | 230-567 | 35-551 | 0-13 | | 347-1,060 |
| POTR-PICO/SYOR | 2 | | | | | 3 | |
| mean | | 186 | 320 | 91 | 8 | | 961 |
| SE | | 10 | 173 | 56 | 1 | | |
| range | | 176-196 | 147-492 | 35-147 | 7-10 | | 491-1,688 |
| POTR-PICO/CAGE | 5 | | | | | 5 | |
| mean | | 19 | 419 | 256 | 8 | | 694 |
| SE | | 6 | 134 | 88 | 2 | | 100 |
| range | | 7-37 | 16-740 | 112-587 | 3-15 | | 326-925 |
| POTR-PSME/AMAL | 5 | | | | | 6 | |
| mean | | 382 | 426 | 136 | 7 | | 1,034 |
| SE | | 78 | 78 | 53 | 3 | | 149 |
| range | | 173-613 | 214-622 | 6-311 | 0-16 | | 629-1556 |
| POTR-PSME/SYOR | 5 | | | | | 7 | |
| mean | | 110 | 401 | 513 | 14 | | 1,409 |
| SE | | 51 | 95 | 110 | 4 | | 356 |
| range | | 13-236 | 156-628 | 349-943 | 6-31 | | 626-3,466 |
| POTR-PSME/JUCO | 1 | | | | | 1 | |
| mean | | 10 | 315 | 7 | 0 | | 331 |
| SE | | — | — | — | — | | — |
| range | | — | — | — | — | | — |
| POTR-PSME/CARU | 1 | | | | | 5 | |
| mean | | 6 | 196 | 358 | 6 | | 1,590 |
| SE | | — | — | — | — | | 414 |
| range | | — | — | — | — | | 559-2,926 |
| POTR-PIPO | 3 | | | | | 3 | |
| mean | | 191 | 316 | 316 | 11 | | 824 |
| SE | | 48 | 153 | 24 | 7 | | 208 |
| range | | 96-240 | 72-599 | 278-359 | 0-24 | | 480-1,198 |
| All stands | (463) | | | | | 633 | |
| mean | | 156 | 581 | 323 | 30 | | 1,095 |
| SE | | 11 | 23 | 16 | 3 | | 25 |
| range | | 0-1,843 | 1-4,001 | 0-2,900 | 0-546 | | 4-4,256 |

[1]Forb production includes production of annuals.

## APPENDIX M: ASPEN COMMUNITY TYPE FIELD FORM FOR INTERMOUNTAIN REGION

**STUDY:** **DATE:** **EXAMINER:**

CANOPY COVER ESTIMATES:
Estimate cover of each species as:
-trace(T) if less than 0.5%
-to nearest 1% if less than 10%
-to nearest 5% if over 10%

Estimate cover of trees (over 1.4 m high) and reproduction (less than 1.4 m high) separately (e.g. 40/5).

TOPOGRAPHY:
1-Ridge 4-Lower slope
2-Upper slope 5-Bench/flat
3-Mid slope 6-Stream bottom

CONFIGURATION:
1-Convex 3-Concave
2-Straight 4-Undulate

| | | | | |
|---|---|---|---|---|
| Plot No. | | | | |
| Meridan | | | | |
| T,R,S | | | | |
| Elevation | | | | |
| Aspect | | | | |
| % slope | | | | |
| Configur. | | | | |
| Other: | | | | |

| Scientific Name | Abbreviation | Common Name | Canopy Cover | | | |
|---|---|---|---|---|---|---|
| **TREES** | | | | | | |
| *Abies concolor* | ABCO | white fir | ___/___ | ___/___ | ___/___ | ___/___ |
| *Abies lasiocarpa* | ABLA | subalpine fir | ___/___ | ___/___ | ___/___ | ___/___ |
| *Picea engelmannii* | PIEN | Engelmann spruce | / | / | / | / |
| *Picea pungens* | PIPU | blue spruce | ___/___ | ___/___ | ___/___ | ___/___ |
| *Pinus contorta* | PICO | lodgepole pine | ___/___ | ___/___ | ___/___ | ___/___ |
| *Pinus flexilis* | PIFL | limber pine | / | / | / | / |
| *Pinus ponderosa* | PIPO | ponderosa pine | ___/___ | ___/___ | ___/___ | ___/___ |
| *Populus tremuloides* | POTR | quaking aspen | ___/___ | ___/___ | ___/___ | ___/___ |
| *Pseudotsuga menziesii* | PSME | Douglas-fir | / | / | / | / |
| **SHRUBS** | | | | | | |
| *Acer grandidentatum* | ACGR | canyon maple | | | | |
| *Amelanchier alnifolia* | AMAL | western serviceberry | | | | |
| *Arctostaphylos patula* | ARPA | greenleaf manzanita | | | | |
| *Artemisia tridentata* | ARTR | big sagebrush | | | | |
| *Juniperus communis* | JUCO | common juniper | | | | |
| *Pachistima myrsinites* | PAMY | myrtle pachystima | | | | |
| *Prunus virginiana* | PRVI | chokecherry | | | | |
| *Rosa* spp. | ROSA | rose | | | | |
| *Rubus parviflorus* | RUPA | thimbleberry | | | | |
| *Salix scouleriana* | SASC | Scouler willow | | | | |
| *Sambucus* spp. | SAMB | elderberry | | | | |
| *Shepherdia canadensis* | SHCA | russet buffaloberry | | | | |
| *Spiraea betulifolia* | SPBE | white spirea | | | | |
| *Symphoricarpos oreophilus* | SYOR | mountain snowberry | | | | |
| **GRAMINOIDS** | | | | | | |
| *Agropyron trachycaulum* | AGTR | slender wheatgrass | | | | |
| *Bromus anomalus* | BRAN | nodding brome | | | | |
| *Bromus carinatus* | BRCA | mountain brome | | | | |
| *Calamagrostis rubescens* | CARU | pinegrass | | | | |
| *Carex geyeri* | CAGE | elk sedge | | | | |
| *Carex rossii* | CARO | Ross sedge | | | | |
| *Elymus glaucus* | ELGL | blue wildrye | | | | |
| *Festuca idahoensis* | FEID | Idaho fescue | | | | |
| *Festuca thurberi* | FETH | Thurber fescue | | | | |
| *Poa pratensis* | POPR | Kentucky bluegrass | | | | |
| *Sitanion hysterix* | SIHY | bottlebrush squirreltail | | | | |
| *Stipa comata* | STCO | needle-and-thread | | | | |
| **FORBS** | | | | | | |
| *Agastache urticifolia* | AGUR | nettleleaf giant hyssop | | | | |
| *Aster engelmannii* | ASEN | Engelmann aster | | | | |
| *Astragalus miser* | ASMI | weedy milkvetch | | | | |
| *Delphinium occidentale* | DEOC | duncecap larkspur | | | | |
| *Geranium viscosissimum* | GEVI | sticky geranium | | | | |
| *Hackelia floribunda* | HAFL | showy stickseed | | | | |
| *Heracleum lanatum* | HELA | common cowparsnip | | | | |
| *Lupinus argenteus* | LUAR | silvery lupine | | | | |
| *Mertensia arizonica* | MEAR | tall bluebell | | | | |
| *Osmorhiza chilensis* | OSCH | sweetroot | | | | |
| *Osmorhiza occidentalis* | OSOC | sweetanise | | | | |
| *Pteridium aquilinum* | PTAQ | brakenfern | | | | |
| *Rudbeckia occidentalis* | RUOC | western coneflower | | | | |
| *Senecio serra* | SESE | butterweed groundsel | | | | |
| *Thalictrum fendleri* | THFE | Fendler meadowrue | | | | |
| *Valeriana occidentalis* | VAOC | western valerian | | | | |
| *Veratrum californicum* | VECA | California false-hellebore | | | | |
| *Wyethia amplexicaulis* | WYAM | mulesear wyethia | | | | |
| | | COVER TYPE | | | | |
| | | COMMUNITY TYPE | | | | |

Mueggler, Walter F. 1988. Aspen community types of the Intermountain Region. Gen. Tech. Rep. INT-250. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 135 p.

This vegetation classification is based upon existing community structure and composition in the aspen-dominated forests of the Intermountain Region of the Forest Service. The 56 community types occur within eight tree-cover types. A diagnostic key using indicator species facilitates field identification of the community types. Vegetational composition, productivity, and successional status are included. Tables provide detailed comparisons of community types. The classification and descriptions are based upon field data from over 2,100 aspen stands scattered over southeastern Idaho, western Wyoming, Utah, and Nevada.

KEYWORDS: aspen forests, community types, plant communities, forest ecology, classification, Utah, Nevada, Idaho, Wyoming

# INTERMOUNTAIN RESEARCH STATION

The Intermountain Research Station provides scientific knowledge and technology to improve management, protection, and use of the forests and rangelands of the Intermountain West. Research is designed to meet the needs of National Forest managers, Federal and State agencies, industry, academic institutions, public and private organizations, and individuals. Results of research are made available through publications, symposia, workshops, training sessions, and personal contacts.

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